EFFECTS OF ABDOMINAL DRAWING IN MANEUVER ON GAIT AND PAIN IN INDIVIDUALS WITH LOW BACK PAIN - A COMPARATIVE STUDY

Dissertation submitted to the Tamilnadu Dr. M.G.R. Medical University towards partial fulfillment of the requirements of **MASTER OF PHYSIOTHERAPY (Advanced PT in Orthopaedics) Degree Programme.**

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CERTIFICATE

This is to certify that research work entitled **"EFFECTS OF ABDOMINAL DRAWING IN MANEUVER ON GAIT AND PAIN IN INDIVIDUALS WITH LOW BACK PAIN." – A COMPARATIVE STUDY** was carried out by the candidate bearing the Register No:**27101602**, KMCH College of Physiotherapy towards partial fulfillment of the requirements of the **Master of Physiotherapy (Advanced PT in Orthopaedics)** of the Tamil Nadu Dr. M.G.R. Medical University, Chennai-32.

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ABSTRACT

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Objectives

To evaluate the effect of abdominal drawing in maneuver on gait parameters in subjects with and without low back pain and also to evaluate the percentage of pain reduction in patients with chronic low back ache.

Study Design

A Pre test and post test experimental design.

Sampling technique

Purposive sampling

Study Setting

Department of Physical Medicine and Rehabilitation, KOVAI MEDICAL CENTER AND HOSPITAL, Coimbatore.

Methodology

Total number of 30 subjects was taken and they were divided into two groups by purposive sampling. Group A is subjects with low back pain and Group B is subjects without low back pain. Outcome measures were Average step cycle, Average step length, Coefficient of variation, Time on each foot, Ambulation index measured with Biodex gait trainer 2 and Pain is measured with Revised-Oswestry low back pain questionnaire.

Results

Paired‘t’ test and independent ‘t’ test were done and it was found that there was significant difference between low back pain group and control group in improving gait parameters and reducing the pain by measuring with and without Abdominal Drawing In Maneuver

Conclusion

Our findings suggests that gait parameters can be improved by training with abdominal drawing in maneuver thereby it reduces the pain and improves the gait symmetry in low back pain group subjects.

Key words: Low back pain, Abdominal drawing in maneuver, Ambulation index, Biodex gait trainer 2, Transverse Abdominis.

INTRODUCTION

1. INTRODUCTION

Back pain is the common musculoskeletal condition with a high prevalence of up to 80% among the general and work force population at some times in their lives. A common general classification in clinical settings is mechanical back pain, which includes patients without an identifiable patho-anatomic cause. [11] The operational definition of mechanical back pain most frequently requires that the pain be exacerbated by motion.[31]

Chronic low back pain is defined as pain which persisting for at least 12 weeks. Mechanical low back pain is mainly due to deconditioned low back musculature and weak core stabilizers. People with back pain have reduced endurance of their lumbar stabilizing muscles and also slower reaction time in activating the muscles along with impaired thorax-pelvis co-ordination which may undermine functional walking compared to healthy individuals.

Walkers with back pain may adopt a strategy whereby they modify their pattern of muscular activity in an attempt to reduce the sensation of pain, thus they exhibit an abnormal gait pattern, characterized by shorter stride length, greater step width. In other words, they adopt a 'protective guarding' or 'splinting' strategy by restricting movements of the spine and also they exhibit poorer motor control, and suffer from reduced Proprioception, which limits their ability to adapt their gait pattern to changing circumstances.[21] As a result, the walkers compensate for their poorer motor control by deliberately adopting a slower and less flexible gait.

The transverse abdominis muscle is an important unconscious motor activity to provide a stabilizing force which increases intra-abdominal pressure and, through its insertion into the thoracolumbar fascia, resulted in increased stiffness of the lumbar spine.[19] Transverse abdominis contracts prior to limb movement in healthy individuals, while the pre-activation is poor in those with back pain. [30]

The abdominal drawing-in maneuver has been described as the best way to activate the Transverse abdominis and is often a fundamental exercise in a traditional stabilization program for Low back pain[9]. The Abdominal drawing in maneuver is an inward movement of the lower

abdominal wall in which the patient is instructed to draw the umbilicus toward the spine while maintaining a normal lumbar lordotic curve along with relaxation of the more superficial musculature (rectus abdominis, external oblique) was found to be associated with an unconscious co-contraction of the lower lumbar multifidi .This co-contraction of the Transverse abdominis and the Multifidi increased stability of the lumbar spine. The abdominal drawing in maneuver is often used to facilitate the re-education of neuromuscular control mechanisms provided by the local stabilizing muscles[17.] This training of the transverse abdominis has been shown to improve pain and the lower extremity function in patients with chronic low back pain by improving stability of the spine.[16]

Biodex gait trainer 2 is designed specifically for assessing the gait parameters .The gait parameters measured by this gait trainer are average step length, average step cycle, average walking speed, time on each foot, coefficient of variance, and ambulation index.

BACK GROUND

2. BACK GROUND

A simple and practical classification, which has gained international acceptance, is to divide low back pain into three categories – the so-called "diagnostic triage" **(Waddell 1987).**

• Specific spinal pathology

• Nerve root pain and radicular pain

• Non-specific low back pain[11]

The low back pain occurs as a result of faulty neuromuscular control, rather than from true ligamentous instability. Muscular injury, fatigue, or facet or disc degeneration can compromise the stabilizing effects resulting in shearing forces that cause the pain **(Susan A. Salibaet et al).** [34] A decrease in muscular control can have damaging effects on postural control and intersegmental stability which may lead to degeneration of spinal structures. Therefore, this subgroup of patients would likely respond to a spinal neuromuscular rehabilitation program that targets the spinal stabilizers.

The Abdominal drawing in maneuver is used to facilitate the re-education of neuromuscular control mechanisms provided by the local stabilizing muscles.[17] This training of the Transverse abdominis has been shown to improve pain and function in patients with chronic low back pain because activating these muscles is thought to assist in dynamic spine stabilization during functional tasks.[26] Abdominal or Core training is thought to improve balance, postural control, improves the lower extremity function and reduces the risk of lower extremity injuries.

Majority of the studies on back ache concentrated only on pain reduction and very few studies concentrated on back ache and gait pattern. So this study is to measure the gait parameters before and after abdominal drawing in maneuver in chronic mechanical low back ache subjects.

NEED FOR STUDY

3. NEED FOR THE STUDY

Patients with mechanical low back ache have changes in their gait pattern because of variations in their gait parameters. Till now there are so many studies on the abdominal drawing in maneuver as a therapy for low back pain patients for the reduction in the pain and very few studies are there on assessing the gait parameters in back pain patients. So this study is to find out the effect of real -time abdominal drawing in maneuver on gait parameters in patients with chronic mechanical low back pain with the help of Biodex gait trainer 2 and to find out the reduction in pain with the help of Revised Oswestry questionnaire.

REVIEW OF LITERATURE

4. REVIEW OF LITERATURE

4.1 Abdominal drawing in maneuver creates activation of transverse abdominis

Venu Akuthota et al., (2008)

They said that "The abdominals serve as a vital component of the core". The transversus abdominis has received attention for its stabilizing effects. It has fibers that run horizontally creating a belt around the abdomen. ''Hollowing in'' of the abdomen creates isolated activation of the transversus abdominis.[38]

Peter B. O'Sullivan et al., (1998)

In his study said that the abdominal drawing in maneuver was chosen to assess deep abdominal muscle function, as it has been shown in pain-free populations to preferentially activate the deep abdominal muscles with minimal activation of the rectus abdominis.[29]

Deydre S. Teyhen et al., (2005)

They said that the real time abdominal drawing in maneuver results in preferential activation of the transversus abdominis in patients with Low back pain and support its use as a foundational component for lumbar stabilization training programs.[9]

Seung-Chul Chon et al., (2010)

He says that the ADIM combined with ankle dorsiflexion is useful in enhancing muscle activity and associated morphological changes in the Transverse abdominis muscle. It offers clinical insights into the additive effect of ankle dorsiflexion in selectively stimulating the Transverse abdominis muscle, and suggests that it may be used as an alternative core stabilization technique for the management of patients with low back pain.[34]

4.2 Transverse abdominis activation reduces the risk of low back pain

Malik Slosberg et al., (2009)

In his study said that Transverse abdominis muscle is an important unconscious motor activity to provide a stabilizing force which increased intra-abdominal pressure and, through its insertion into the thoracolumbar fascia, resulted in increased stiffness of the lumbar spine. In addition, voluntary transverse abdominis contraction, while maintaining a normal lumbar

lordotic curve or neutral spine was found to be associated with an unconscious co-contraction of the lower lumbar multifidi. This co-contraction of the transverse abdominis and the multifidus increased stability of the lumbar spine, decreases the low back pain and reduce the risk of subsequent low back injury.[20]

Matthew J. Gage et al., (2009)

They done a study on the effects of abdominal training on postural control, lower extremity kinematics, kinetics, and muscle activation on 60 healthy subjects and said that Abdominal or "core" training is thought to improve balance, postural control, improves the lower extremity function and reduces the risk of lower extremity injuries.[21]

Jull et al, et al., (1995)

In his study he said that a program for the transverse abdominis and multifidus is required for specific lumbar segmental stabilization training, which is reasoned as a knowledge of the muscle dysfunction found in individuals with a history of lower back problems.

Hides, Julie A et al., (2001)

They done a study on 39 low back pain patients and concluded that transverse abdominis and multifidus training is necessary for long term effects of reduction in low back pain along with medical treatment.[15]

Peter B. O'Sullivan et al., (1998)

This study says that subjects with chronic low back pain has a reduced ability to isolate the transverse abdominis pattern of activation has been reported and he concluded that the abdominal drawing in maneuver has been shown to be repeatable between trials and, in recent times, this method of activating deep abdominal muscle function has been widely adopted as a means of evaluating and training the function of the deep abdominal muscles which will reduce the low back pain.[29]

Venu Akuthota et al., (2008)

He stated that the transverses abdominis and multifidi have been shown to contract 30 ms before movement of the shoulder and 110 ms before movement of the leg in healthy people, theoretically to stabilize the lumbar spine. However, patients with low back patients have delayed contraction of the transverses abdominis and multifidi prior to limb movement. The internal oblique and the transverses abdominis work together to increase the intra-abdominal

pressure from the hoop created via the thoracolumbar fascia. Increased intra-abdominal pressure has been shown to impart stiffness to the spine and there by reduces the risk of low back pain.[38]

Deydre S. Teyhen et al., (2005)

In his study said that the Abdominal drawing-in maneuver is commonly used as a foundational component of lumbar stabilization training programs. This maneuver is designed to facilitate co-activation of the Transverse abdominis and multifidus muscles to stabilize the trunk prior to limb movement. Rehabilitation focused on preferential activation of the deep trunk muscles during active movement has been theorized to improve the stability of the lumbar spine and has been found to significantly decrease symptoms associated with low back pain.[9]

Tasha Stantonet et al., (2008)

They done a study on "The Effect of Abdominal Stabilization Contractions on Postero-anterior Spinal Stiffness" and says that the abdominal hollowing have been shown to activate transversus abdominis, (a deep abdominal muscle) and multifidus (a deep lumbar spine muscle), respectively. Preferential activation of these muscles is thought to provide intersegmental stability to the low back through an increase in intra-abdominal pressure and tensioning of the thoracolumbar fascia facilitated by Transverse abdominis contraction and direct control of intersegmental movement due to the unique intervertebral attachments of multifidus. Because in these effects there is a decrease in low back pain. So it is concluded that prescription of the abdominal hollow stabilization contraction has been employed as a strategy to reduce low back pain.[36]

Susan A. Salibaet et al., (2010)

They said that the abdominal drawing in maneuver is often used for re-education of neuromuscular control mechanisms provided by the local stabilizing muscles. This training of the transverse abdominis shown to have improvement on pain and function in patients with chronic low back pain, because activating these muscles is thought to assist in dynamic spine stabilization during functional tasks.[35]

P. W. Hodges et al., (1999)

In his study said that transverses abdominis , the deepest of the abdominal muscle provides a specific contribution to spinal stability and that its function is impaired in the presence of low back pain and he concluded that transverse abdominis training will improve the condition of the low back pain patients.[31]

Seung-Chul Chon et al., (2010)

In his study that the use of the Abdominal drawing in maneuver, in particular, is far more effective than the use of general core stabilization techniques in improving the Transverse abdominus muscle activation. Thus, core stabilization techniques that incorporate the selective motor recruitment of the central core stabilizer, such as the Transverse abdominis muscle activation is activation are necessary for effective management of low back pain.[34]

4.3 Altered gait parameters in low back pain patients

Claudine J. C. Lamoth et al., (2006)

They done a study on "Effects of chronic low back pain on trunk coordination and back muscle activity during walking" in 33 subjects and concluded that Low back pain induces changes in gait, such as a reduced walking velocity, so while training for low back pain patients all has to consider gait training as well as exercises aimed at improving both intersegmental and muscle coordination.[3]

Claudine JC Lamoth et al., (2008)

They done a study on "Effects of attention on the control of locomotion in individuals with chronic low back pain" and concluded that Gait in back pain patients was characterized by less upper body movements. The reduced flexibility in trunk coordination was aggravated under the influence of an attention demanding task. This provides evidence that individuals with low back ache tighten their gait control, and this suggests a stronger cognitive regulation of gait coordination in low back ache. These changes in gait coordination reduce the capability to deal with unexpected perturbations.[2]

Cormac G Ryan et al., (2009)

They done a study on "chronic low back pain have a lower level and an altered pattern of physical activity compared with matched controls" and concluded that people with low back ache have a lower level and pattern of physical activity compared to normals. The chronic low back pain patients took fewer steps during long walks and their cadence is also reduced.[5]

Vogt, K. et al., (2003)

Their study on "Neuromuscular control of walking with chronic low-back pain" in 33 subjects (17 low back pain patients and 16 healthy individuals) concludes that there is a significant differences in hip joint range of motion, stride time and significantly earlier onsets of

the lumbar spine and hip extensors of the back pain sufferers compared with the healthy controls.[18]

Heredia Jimenez et al., (2010)

They done a study on "Gait parameters impaired in women with fibromyalgia" and concluded that the gait parameters of women affected by fibromyalgia syndrome are severely impaired compared with those of healthy women, and the significant differences found in velocity, stride length, cadence, single-support ratio, double-support ratio, stance-phase ratio, and swing-phase ratio.[14]

David Newell et al., (2010)

They done a study on "Measures of complexity during walking in chronic non-specific low back pain patients" and concluded that **low** back pain subjects had a slower walking velocity, smaller step length and reduced complexity compared to control subjects.[7]

John D. Willson et al., (2005)

They done a study on Core Stability and Its Relationship to Lower Extremity Function and Injury and concluded that decreased core stability may predispose to lower extremity injuries so appropriate training may reduce injury and improve the lower extremity function.[16]

4.4 LUMBAR STABILIZATION CRITERIA

Susan A. Saliba et al., (2010)

They have done a study on "transverse abdominis activation with stable and unstable bridging exercises" with the subjects of low back pain according to lumbar stabilization classification or best-fit categorization. The criteria for the lumbar stabilization classification has clinical prediction rule. Subjects that meet 3 out of these 4 criteria is included in this study.[35]

Fritz, J.M et al., (2007)

They done a study on treatment classification guidelines and prediction rules and given the Stabilization classification as follows,

Frequent prior episodes of low back pain (increasing frequency)

Less than 40 years of age

Average range of motion of straight leg raises greater than 91 degrees

Positive prone instability test

Instability Catch or painful arcs during lumbar flexion/extension[11]

Barr KP et al., (2003)

In his study says about that there is an efficiency of a lumbar stabilization program to treat low back pain

4.5 BIODEX GAIT TRAINER 2 FOR ASSESSING THE GAIT PARAMETERS

Nevein MM Gharib et al., (2011)

They assessed gait parameters with Biodex gait trainer 2 including average step length, walking speed, time on each foot (% of gait cycle) and ambulation index in hemipaeritic cerebral palsy children divided into two groups (experimental and control group) and concluded that Biodex gait trainer 2 is effective in assessing and training gait parameters and also there is a significant improvement in walking performance compared with the pre measurements in experimental group.[24]

4.6 CHRONIC LOW BACK PAIN

Bruce F Walker D.C et al., (1992)

This study defines chronic low back pain as pain lasting from six months or regular intermittent low back pain attacks over more than one year period.[1]

4.7 REVISED OSWESTRY LOW BACK PAIN QUESTIONNAIRE

Shawaryn et al., (2001)

He said that abbreviated version of the Oswestry low back pain questionnaire can be applied to measure low back pain more efficiently.

Fairbanks JCT, kouper J davies JB, O brien , JT. Et al., (1980)

Study used Revised Oswestry questionnaire to measure pain and disability in low back pain patients[10]

AIM AND OBJECTIVES

5. AIM AND OBJECTIVES

5.1 AIM OF THE STUDY

To evaluate the effect of abdominal drawing in maneuver on gait parameters in subjects with and without low back pain and also to evaluate the percentage of pain reduction in patients with chronic low back ache.

5.2 OBJECTIVES OF THE STUDY

To find out the effect of gait parameters in subjects with and without low back pain subjects.

To find out the effect of real-time abdominal drawing in maneuver on gait parameters in subjects with and without low back pain.

To find out the effect of abdominal drawing in maneuver in percentage of pain reduction in subjects with chronic low back pain.

To compare the effect of real gait parameters in subjects with and without low back pain.

MATERIALS AND METHODOLOGY

6. MATERIALS AND METHODOLOGY

6.1 STUDY DESIGN

A Pre test and post test experimental design.

6.2 SAMPLING TECHNIQUE

Purposive sampling

6.3 STUDY POPULATION

Consists of 30 subjects, which assigned into two groups

(15 subjects with chronic low back pain, 15 subjects without low back pain).

6.4 STUDY SETTING

Department of Physical Medicine and Rehabilitation, KOVAI MEDICAL CENTER AND HOSPITAL

6.5 STUDY DURATION

Six months

6.6 TREATMENT DURATION

Four weeks

6.7 INCLUSION CRITERIA

Age 20-40 years.

Both males and females.

People who are having low back pain more than 12 weeks.

Revised Oswestry Low Back Pain Questionnaire – >20%

Based on clinical prediction rule, out of 4 components 3 has to be there.

6.8 EXCLUSION CRITERIA

People who are having low back pain less than 12 weeks

People who do not able to meet the clinical prediction rule

Any surgery to the spine and lower extremities

Unstable cardiac or pulmonary problems.

Any neuromuscular diseases.

6.9 MEASUREMENT TOOL

BIODEX GAIT TRAINER 2

The Gait Training Mode is useful for the rehabilitation and retraining of gait for patients with neuralgic and orthopedic gait dysfunctions. It provides both audio and visual feedback for patient compliance. The rhythmic movement of the tread belt along with the audio and visual

biofeedback provides the necessary stimulus for retraining neural pathways, thus improving the gait pattern of the patient.

Revised Oswestry Low Back Pain Questionnaire

This questionnaire is designed to enable us to understand how much your low back pain has affected your ability to manage your everyday activities.

6.10 OUT COME MEASURES

Average step cycle
Average step length
Coefficient of variance
Time on each foot
Ambulation index
Pain

6.11 NULL HYPOTHESIS

H01 There is no significant improvement of gait parameters in subjects with chronic low back ache.

H02. There is no significant improvement of gait parameters in subjects without low back ache

H03. There is no significant improvement in gait parameters with real-time abdominal drawing in maneuver in subjects with chronic low back ache.

H04. There is no significant improvement in gait parameters with real-time abdominal drawing in maneuver in subjects without low back ache.

H05. There is no significant reduction in percentage of pain in subjects with chronic low back pain

H06. There is no significant difference in gait parameters with real-time abdominal drawing in maneuver in people with chronic low back ache compared with people without low back ache.

6.12 ALTERNATE HYPOTHESIS

HA1. There is a significant improvement of gait parameters in subjects with chronic low back ache.

HA2 There is a significant improvement of gait parameters in subjects without low back ache.

HA3. There is a significant improvement in gait parameters with real-time abdominal drawing in maneuver in subjects with chronic low back ache.

HA4. There is a significant improvement in gait parameters with real-time abdominal drawing in maneuver in subjects without low back ache.

HA5. There is a significant reduction in percentage of pain in subjects with chronic low back pain

HA6. There will be a significant difference in gait parameters with real-time abdominal drawing in maneuver in people with chronic low back ache patients compared with people without low back ache.

6.13 STUDY METHOD

The subjects were divided into two groups Group- A and Group- B

Group-A

Consists of 15 subjects with chronic low back pain

Group-B

Consists of 15 subjects without low back pain

6.14 PROCEDURE

Low back pain patients who met the inclusion criteria are selected for group-A and the same number of subjects with same age group without low back pain is selected for group-B.

For all the patients two base line measurements of gait parameters with and without abdominal drawing in maneuver are assessed with the help of Biodex gait trainer 2. Auditory biofeedback device is used to maintain the abdominal drawing in maneuver while measuring the abdominal drawing in maneuver procedure. The base line pain measurements for group- A subjects are ascertained by administering the Revised Oswestry low back pain questionnaire. After documenting the base line measurements of all the subjects, the abdominal drawing in maneuver is demonstrated as the subjects are asked to lie in the supine crook-lying position on the treatment table with their knees bent to 90º, feet flat on the table, and arms besides the trunk. The participants were then instructed to perform an abdominal in draw and then push through the heels to lift their hips into the air while maintaining straight alignment of the knees, hips, and shoulders and maintain this for 10 seconds and then ask them to lower their hips back. Further instruct them to continue this for 10 times. Ask the subjects to perform this exercise for 10 times 3 sets per day for four weeks.

After four weeks the post test measurements are taken. The parameters assessed were average step cycle (cycles/sec), average step length (cm), co-efficient of variance (%), Time on each foot (%), and ambulation index (%).

For evaluation of the gait parameters, each patient was asked to walk over the gait trainer without visual feedback. The tread belt will run at a speed of 2 kilometers / hour. Once the patient was comfortable the data recording was started. Each patient was allowed to walk continuously for three minutes then the evaluation session was finished and the tread belt slowed gradually until it stopped. The results then can be displayed on the display.

The post test pain percentage levels are assessed using Revised Oswestry low back pain questionnaire.

6.15 PHOTOGRAPHIC ILLUSTRATION

6.15.1 GAIT TRAINER

Figure No-1

6.15.2 GAIT ASSESSMENT-WITHOUT ABDOMINAL DRAWING IN MANEUVER

Figure No -2

6.15.3 GAIT ASSESSMENT-WITH ABDOMINAL DRAWING MANEUVER

Figure No-3

6.15.4 ADBOMINAL DRAWING IN MANEUVER IN CROOK LYING

Figure No-4

6.15.5 ABDOMINAL DRAWING IN MANEUVER IN PRONE KNEELING

Figure No-5

6.15.6 ABDOMINAL DRAWING IN MANEUVER IN BRIDGING

Figure No-6

6.16 STATISTICAL TOOL

In this study statistics is used to compare group A and group B by means of independent "t" test and paired "t" test.

6.16.1 PAIRED't' TEST (within groups)

$$t = \frac{\bar{d}}{\quad}$$

Where,

$$S = \sqrt{\quad}$$

S=combined standard deviation

= difference between initial & final readings in 2 groups respectively.

, n_2 = number of patients in 2 groups respectively.

6.16.2 INDEPENDENT `t' TEST (between groups)

$$t = \frac{\overline{X1} - \overline{X2}}{S} \sqrt{\frac{n_1 n_2}{(n_1 + n_2)}}$$

Where,

$$S = \sqrt{\frac{\sum d_1^2 + \sum d_2^2}{n_1 + n_2 - 2}}$$

S=combined standard deviation

= difference between initial & final readings in 2 groups respectively.

, n_2 = number of patients in 2 groups respectively.

DATA PRESENTATION

7. DATA PRESENTATION

7.1 TABULATION

7.1.1 PAIRED‘t’ TEST

Paired‘t’ Test for Pain in Low Back Pain Group (Group – A)

Group	Parameter in percentage (%)	Pre-test Mean value	Post-test Mean value	Paired – ‘t’ value	Table – ‘t’ value
Low back pain	pain	82.0000	67.0000	10.869	2.145

Table no. 1

Paired‘t’ test for Step Cycle with Abdominal Drawing In Maneuver in Low Back Pain Group (Group-A)

Group	Parameter Cycles/sec	Pre-test Mean value	Post-test Mean value	Paired – ‘t’ value	Table – ‘t’ value
Group –A	Average step cycle	0.8993	0.8740	1.281	2.145

Table no.2

Paired‘t’ test for step length with Abdominal Drawing In Maneuver in Low Back Pain Group (Group-A)

Group	Parameter In centimeter	Pre-test Mean values	Post-test Mean values	Paired – T value	Table – T value
Group –A	Average step length (left)	44.1533	52.080	4.562	2.145
Group-A	Average step length (right)	58.9200	64.9667	5.193	

Table no.3

Paired‘t’ test for Low Back Pain Group (Group-A) With Abdominal Drawing In Maneuver

Group	Parameters In percentage	Pre-test Mean values	Post-test Mean values	Paired – ‘t’ value	Table – ‘t’ value
Group – A	Coefficient of variance (left)	14.8933	11.2667	2.696	2.145
Group – A	Coefficient of variance (right)	11.0867	9.6933	1.392	
Group – A	Time on each foot (left)	46.3267	49.4667	3.500	
Group – A	Time on each foot (right)	49.3600	51.2000	2.161	
Group – A	Ambulation index	87.8267	90.3067	3.223	

Table no.4

Paired‘t’ test for Step Cycle without Abdominal Drawing In Maneuver in Low Back Pain Group (Group-A)

Group	Parameter in cycles/sec	Pre-test Mean value	Post-test Mean value	Paired – ‘t’ value	Table – ‘t’ value
Group –A	Average step cycle	0.8700	0.8380	1.821	2.145

Table no.5

Paired‘t’ test for Step length without Abdominal Drawing In Maneuver in Low back pain Group (Group-A)

Group	Parameter in centimeter	Pre-test Mean values	Post-test Mean values	Paired – ‘t’ value	Table – ‘t’ value
Group –A	Average step length (left)	45.4667	50.3000	2.435	2.145
Group-A	Average step length (right)	60.5933	62.7400	2.804	

Table no.6

Paired‘t’ test for Low Back Pain Group (Group-A) Without Abdominal Drawing In Maneuver

Group	Parameters in percentage	Pre-test Mean values	Post-test Mean values	Paired – ‘t’ value	Table – ‘t’ value
Group –A	Coefficient of variance (left)	12.7200	12.7467	0.022	2.145
Group –A	Coefficient of variance (right)	10.6667	9.7600	0.822	
Group –A	Time on each foot (left)	46.5333	48.3667	2.674	
Group –A	Time on each foot (right)	52.7400	49.9867	2.206	
Group –A	Ambulation index	86.8400	88.9867	2.529	

Table no.7

Paired‘t’ test for Step Cycle with Abdominal Drawing In Maneuver in Control Group (Group-B)

Group	Parameter in cycles/sec	Pre-test Mean value	Post-test Mean value	Paired – ‘t’ value	Table – ‘t’ value
Group –B	Average step cycle	0.8700	0.8380	1.821	2.145

Table no.8

Paired‘t’ test for step length with Abdominal Drawing In Maneuver in Control Group (Group-B)

Group	Parameter in percentage	Pre-test Mean value	Post-test Mean value	Paired – ‘t’ value	Table – ‘t’ value
Group-B	Average step length (left)	48.5007	53.5000	5.639	2.145
Group-B	Average step length (right)	58.5800	63.1533	3.610	

Table no.9

Paired‘t’ test for Control Group (Group-B) With Abdominal Drawing In Maneuver

Group	Parameters in Percentage	Pre-test Mean values	Post-test Mean values	Paired – ‘t’ value	Table – ‘t’ value
Group – B	Coefficient of variance (left)	13.6733	9.7267	4.732	2.145
Group – B	Coefficient of variance (right)	11.0667	8.6100	2.429	
Group – B	Time on each foot (left)	43.3200	48.6867	3.867	
Group – B	Time on each foot (right)	49.6933	50.6000	2.509	
Group – B	Ambulation index	88.9820	91.7133	3.562	

Table no.10

Paired‘t’ test for Step Cycle without Abdominal Drawing In Maneuver in Control Group (Group-B)

Group	Parameter in Percentage	Pre-test Mean value	Post-test Mean value	Paired – ‘t’ value	Table – ‘t’ value
Group –B	Average step cycle	0.8373	0.8293	0.757	2.145

Table no.11

Paired‘t’ test for Step Length without Abdominal Drawing In Maneuver in Control Group (Group-B)

Group	Parameter in centimeter	Pre-test Mean value	Post-test Mean value	Paired – ‘t’ value	Table – ‘t’ value
Group -B	Average step length (left)	50.0733	52.7067	2.715	2.145
Group-B	Average step length (right)	60.5467	61.2533	2.697	

Tableno.12

Paired‘t’ test for Control Group (Group-B) Without Abdominal Drawing In Maneuver

Group	Parameters in Percentage	Pre-test Mean value	Post-test Mean value	Paired – ‘t’ value	Table – ‘t’ value
Group-B	Coefficient of variance (left)	11.7200	11.4807	0.283	2.145
Group-B	Coefficient of variance (right)	9.5800	8.7267	1.283	
Group-B	Time on each foot (left)	47.7600	49.0933	3.533	
Group-B	Time on each foot (right)	51.9813	50.5267	3.198	
Group-B	Ambulation index	87.2480	89.1200	2.672	

Table no.13

7.1.2 INDEPENDENT‘t’ TEST

Pre test and Post test values for Group A and Group B with Abdominal Drawing In Maneuver for Step Cycle

Mean Values	Group		Calculated ‘t’ Value	Table ‘t’ Value
	Group-A	Group-B		
Pre Test	0.8993	0.8640	1.781	2.048
Post Test	0.8740	0.8460	1.293	

Table no.14

Pre test and Post test values for Group A and Group B with Abdominal Drawing In Maneuver for Step Length (left side)

Mean Values	Group		Calculated ‘t’ Value	Table ‘t’ Value
	Group-A	Group-B		
Pre Test	44.1533	48.5007	2.633	2.048
Post Test	52.0800	53.5000	0.947	

Table no.15

Pre test and Post test values for Group A and Group B with Abdominal Drawing In Maneuver for Step Length (right side)

Mean Values	Group		Calculated 't' Value	Table 't' Value
	Group-A	Group-B		
Pre Test	58.9200	58.5800	0.199	2.048
Post Test	64.9667	63.1533	0.975	

Table no.16

Pre test and Post test values for Group A with Abdominal Drawing In Maneuver for Step Length (left side and right side)

Mean Values	Group A		Calculated 't' Value	Table 't' Value
	Left Side	Right Side		
Pre Test	44.1533	58.900	7.053	2.048
Post Test	52.0800	64.9667	6.522	

Table no.17

Pre test and Post test values for Group B with Abdominal Drawing In Maneuver for Step Length (left side and right side)

Mean Values	Group B		Calculated 't' Value	Table 't' Value
	Left Side	Right Side		
Pre Test	48.5007	58.5800	8.986	2.048
Post Test	53.5000	63.1533	7.192	

Table no.18

Pre test and Post test values for Group A and Group B with Abdominal Drawing In Maneuver for coefficient of variance (left)

Mean Values	Group		Calculated 't' Value	Table 't' Value
	Group-A	Group-B		
Pre Test	14.8933	13.6733	1.151	2.048
Post Test	11.2667	9.7267	1.199	

Table no.19

Pre test and Post test values for Group A and Group B with Abdominal Drawing In Maneuver for coefficient of variance (right)

Mean Values	Group		Calculated 't' Value	Table 't' Value
	Group-A	Group-B		
Pre Test	11.8067	11.0667	0.016	2.048
Post Test	9.6933	8.6100	1.160	

Table no.20

Pre test and Post test values for Group A with Abdominal Drawing In Maneuver for coefficient of variance (left side and right side)

Mean Values	Group A		Calculated 't' Value	Table 't' Value
	Left Side	Right Side		
Pre Test	14.8933	11.0867	3.378	2.048
Post Test	11.2667	9.6933	1.312	

Table no.21

Pre test and Post test values for Group B with Abdominal Drawing In Maneuver for coefficient of variance (left side and right side)

Mean Values	Group B		Calculated 't' Value	Table 't' Value
	Left Side	Right Side		
Pre Test	13.6733	11.0667	2.167	2.048
Post Test	9.7267	8.6100	1.072	

Table no.22

Pre test and Post test values for Group A and Group B with Abdominal Drawing In Maneuver for time on each foot (left)

Mean Values	Group		Calculated 't' Value	Table 't' Value
	Group-A	Group-B		
Pre Test	46.3267	43.3200	2.015	2.048
Post Test	49.4667	48.6867	1.199	

Table no.23

Pre test and Post test values for Group A and Group B with Abdominal Drawing In Maneuver for time on each foot (right)

Mean Values	Group		Calculated 't' Value	Table 't' Value
	Group-A	Group-B		
Pre Test	49.3600	49.6933	0.394	2.048
Post Test	51.2000	50.6000	0.926	

Table no.24

Pre test and Post test values for Group A with Abdominal Drawing In Maneuver for time on each foot (left side and right side)

Mean Values	Group A		Calculated 't' Value	Table 't' Value
	Left Side	Right Side		
Pre Test	46.3267	49.3600	2.702	2.048
Post Test	49.4667	51.2000	2.601	

Table no.25

Pre test and Post test values for Group B with Abdominal Drawing In Maneuver for time on each foot (left side and right side)

Mean Values	Group B		Calculated 't' Value	Table 't' Value
	Left Side	Right Side		
Pre Test	43.3200	49.6933	4.913	2.048
Post Test	48.6867	50.6000	3.030	

Table no.26

Pre test and Post test values for Group A and Group B with Abdominal Drawing In Maneuver for Ambulation index

Mean Values	Group		Calculated 't' Value	Table 't' Value
	Group-A	Group-B		
Pre Test	87.8267	88.9820	1.247	2.048
Post Test	90.3067	91.7133	1.418	

Table no.27

Pre test and Post test values for Group A and Group B without Abdominal Drawing In Maneuver for Step Cycle

Mean Values	Group		Calculated 't' Value	Table 't' Value
	Group-A	Group-B		
Pre Test	0.8675	0.8379	1.374	2.048
Post Test	0.8400	0.8264	0.709	

Table no.28

Pre test and Post test values for Group A and Group B without Abdominal Drawing In Maneuver for Step Length (left side)

Mean Values	Group		Calculated 't' Value	Table 't' Value
	Group-A	Group-B		
Pre Test	46.1000	49.6786	1.754	2.048
Post Test	50.3438	52.8286	1.846	

Table no.29

Pre test and Post test values for Group A and Group B without Abdominal Drawing In Maneuver for Step Length (right side)

Mean Values	Group		Calculated 't' Value	Table 't' Value
	Group-A	Group-B		
Pre Test	60.1188	61.0857	0.552	2.048
Post Test	62.3187	61.6286	0.464	

Table no.30

Pre test and Post test values for Group A without Abdominal Drawing In Maneuver for Step Length (left side and right side)

Mean Values	Group A		Calculated 't' Value	Table 't' Value
	Left Side	Right Side		
Pre Test	45.4667	60.5933	6.880	2.048
Post Test	50.3000	62.7400	7.291	

Table no.31

Pre test and Post test values for Group B without Abdominal Drawing In Maneuver for Step Length (left side and right side)

Mean Values	Group B		Calculated 't' Value	Table 't' Value
	Left Side	Right Side		
Pre Test	50.0733	60.5467	7.235	2.048
Post Test	52.7067	61.2533	8.352	

Table no.32

Pre test and Post test values for Group A and Group B without Abdominal Drawing In Maneuver for coefficient of variance (left)

Mean Values	Group		Calculated 't' Value	Table 't' Value
	Group-A	Group-B		
Pre Test	12.5750	11.8143	0.641	2.048
Post Test	12.487	11.686	0.892	

Table no.33

Pre test and Post test values for Group A and Group B without Abdominal Drawing In Maneuver for coefficient of variance (right)

Mean Values	Group		Calculated 't' Value	Table 't' Value
	Group-A	Group-B		
Pre Test	10.3750	9.8357	0.537	2.048
Post Test	9.6875	8.7357	0.986	

Table no.34

Pre test and Post test values for Group A without Abdominal Drawing In Maneuver for coefficient of variance (left side and right side)

Mean Values	Group A		Calculated 't' Value	Table 't' Value
	Left Side	Right Side		
Pre Test	12.7200	10.6667	1.790	2.048
Post Test	12.7467	9.7600	3.064	

Table no.35

Pre test and Post test values for Group B without Abdominal Drawing In Maneuver for coefficient of variance (left side and right side)

Mean Values	Group B		Calculated 't' Value	Table 't' Value
	Left Side	Right Side		
Pre Test	11.7200	9.5800	2.095	2.048
Post Test	11.4807	8.7267	3.199	

Table no.36

Pre test and Post test values for Group A and Group B without Abdominal Drawing In Maneuver for Time on each foot (left)

Mean Values	Group		Calculated 't' Value	Table 't' Value
	Group-A	Group-B		
Pre Test	46.7500	47.6000	1.220	2.048
Post Test	48.531	48.957	0.676	

Table no.37

Pre test and Post test values for Group A and Group B without Abdominal Drawing In Maneuver for Time on each foot (right)

Mean Values	Group		Calculated 't' Value	Table 't' Value
	Group-A	Group-B		
Pre Test	52.8812	51.7657	1.036	2.048
Post Test	49.925	50.635	1.008	

Table no.38

Pre test and Post test values for Group A without Abdominal Drawing In Maneuver for Time on each foot (left side and right side)

Mean Values	Group A		Calculated 't' Value	Table 't' Value
	Left Side	Right Side		
Pre Test	46.5333	52.7400	5.399	2.048
Post Test	48.3667	50.9867	2.971	

Table no.39

Pre test and Post test values for Group B without Abdominal Drawing In Maneuver for Time on each foot (left side and right side)

Mean Values	Group B		Calculated 't' Value	Table 't' Value
	Left Side	Right Side		
Pre Test	47.7600	51.9813	7.568	2.048
Post Test	49.0933	50.5267	3.133	

Table no.40

Pre test and Post test values for Group A and Group B without Abdominal Drawing In Maneuver for ambulation index

Mean Values	Group		Calculated 't' Value	Table 't' Value
	Group-A	Group-B		
Pre Test	87.0562	87.0300	0.024	2.048
Post Test	88.9875	89.1286	0.290	

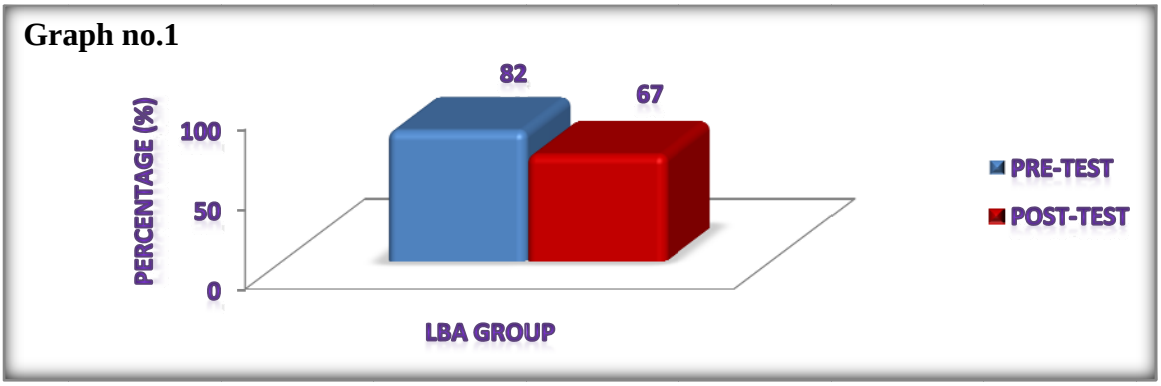
Table no.41

7.2 GRAPHICAL REPRESENTATION

7.2.1 PAIRED 't' TEST

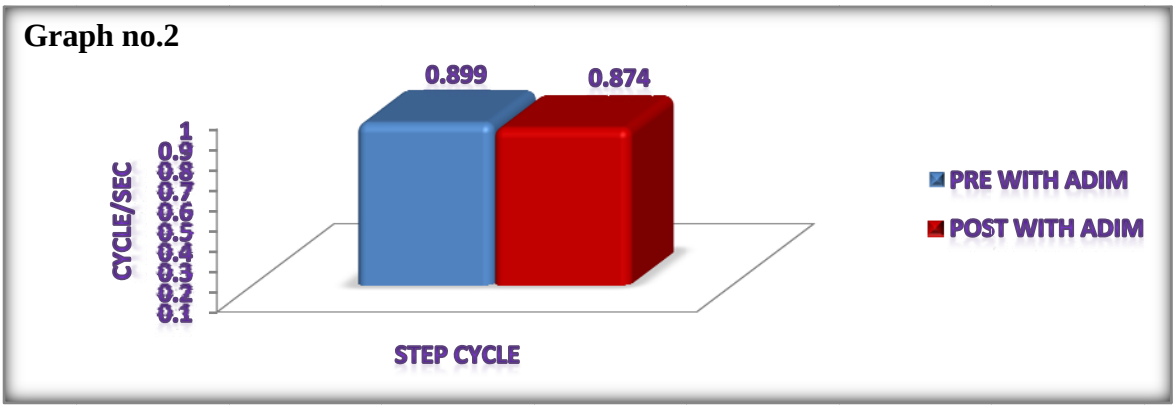
Paired 't' Test for Pain in Group – A

Graph no.1



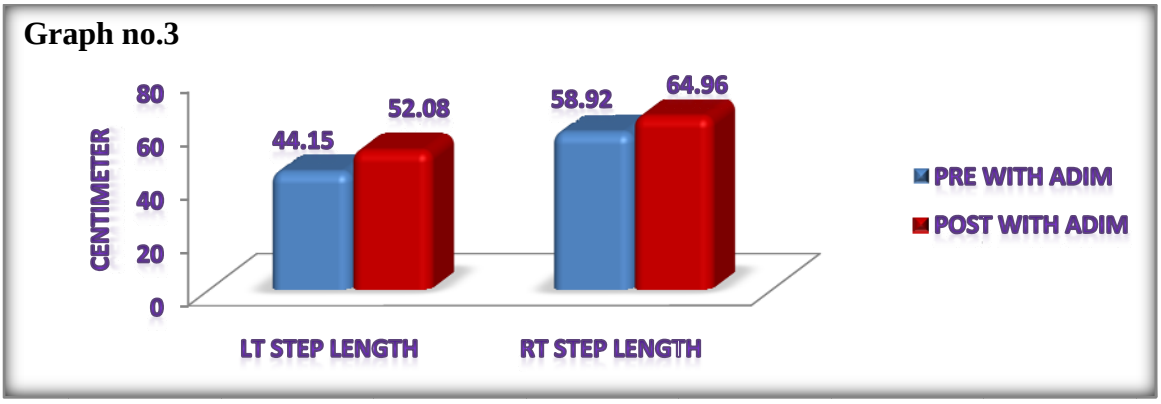
Paired 't' test for Step Cycle with Abdominal Drawing In Maneuver in (Group-A)

Graph no.2

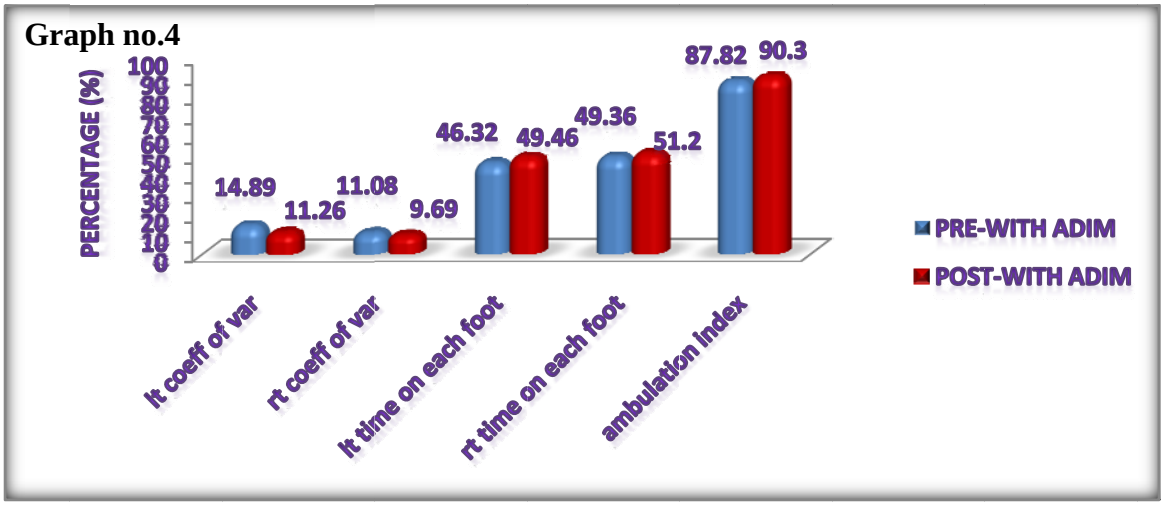


Paired 't' test for step length with Abdominal Drawing In Maneuver in (Group-A)

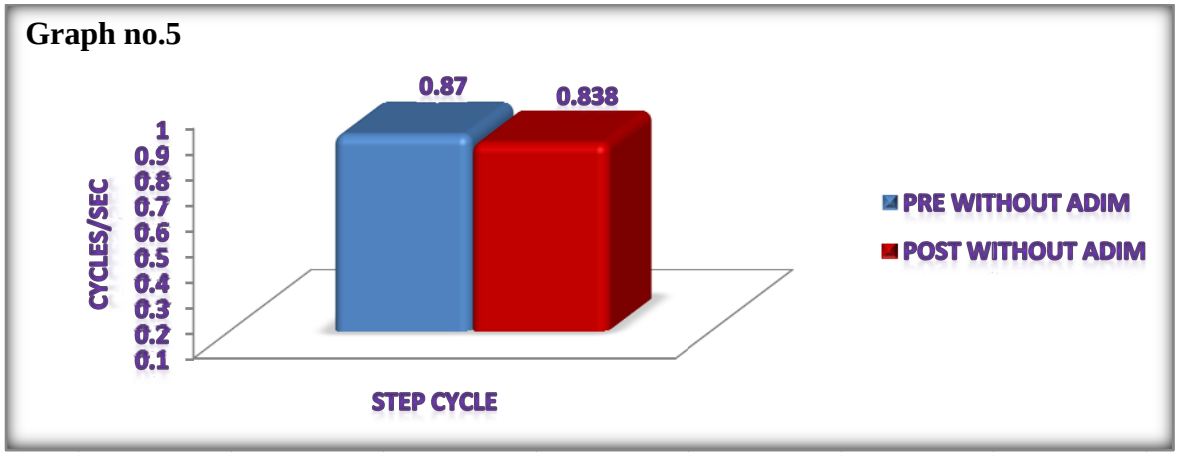
Graph no.3



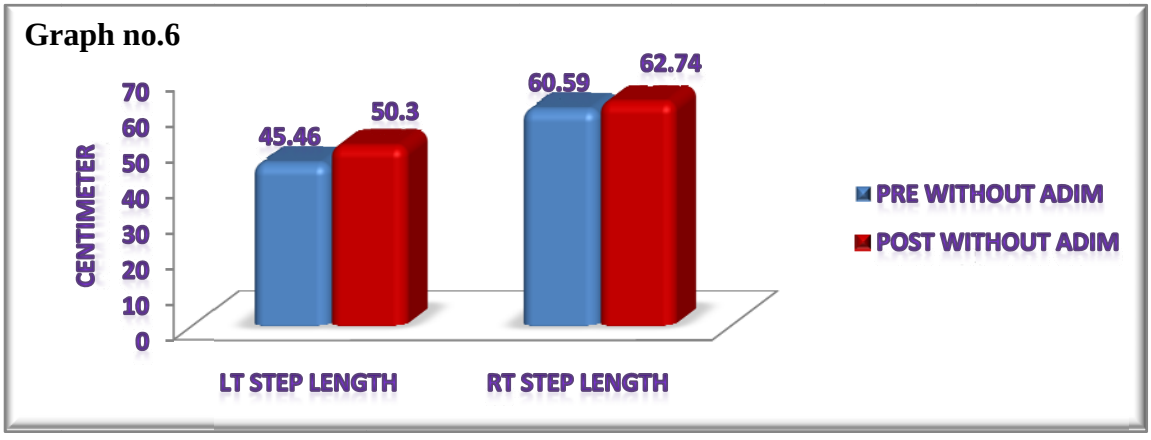
Paired ‘t’ test for (Group-A) With Abdominal Drawing In Maneuver



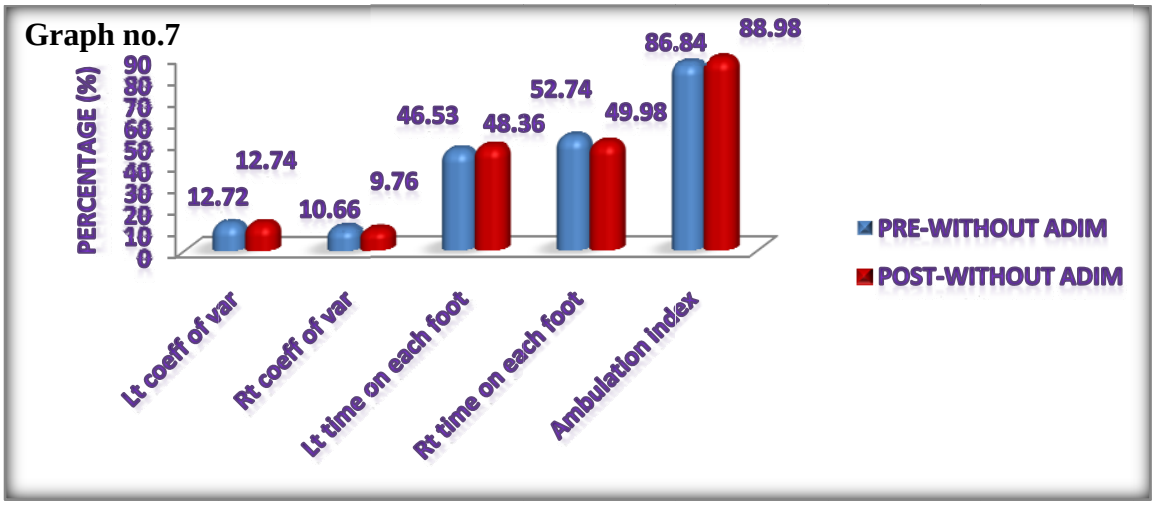
Paired ‘t’ test for Step Cycle without Abdominal Drawing In Maneuver in (Group-A)



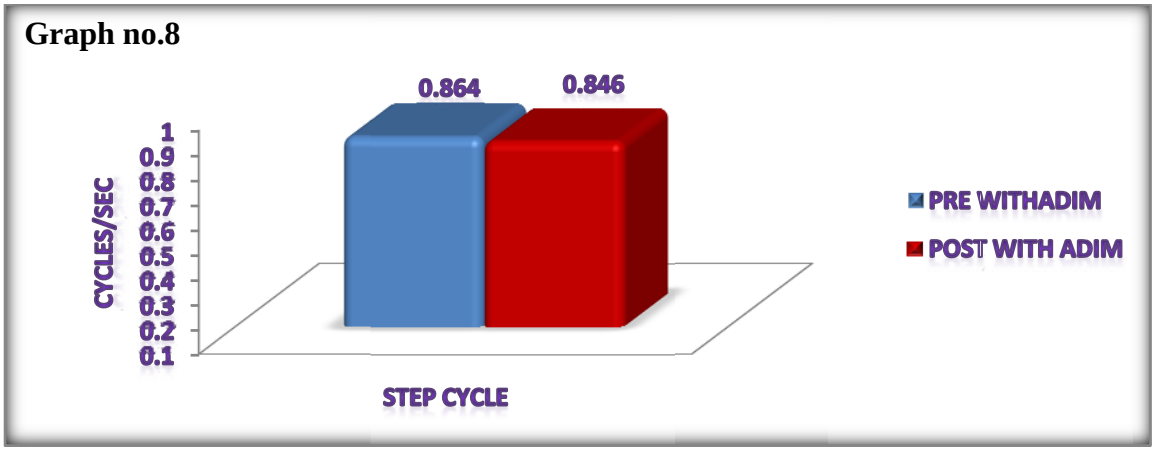
Paired ‘t’ test for Step length without Abdominal Drawing In Maneuver in (Group-A)



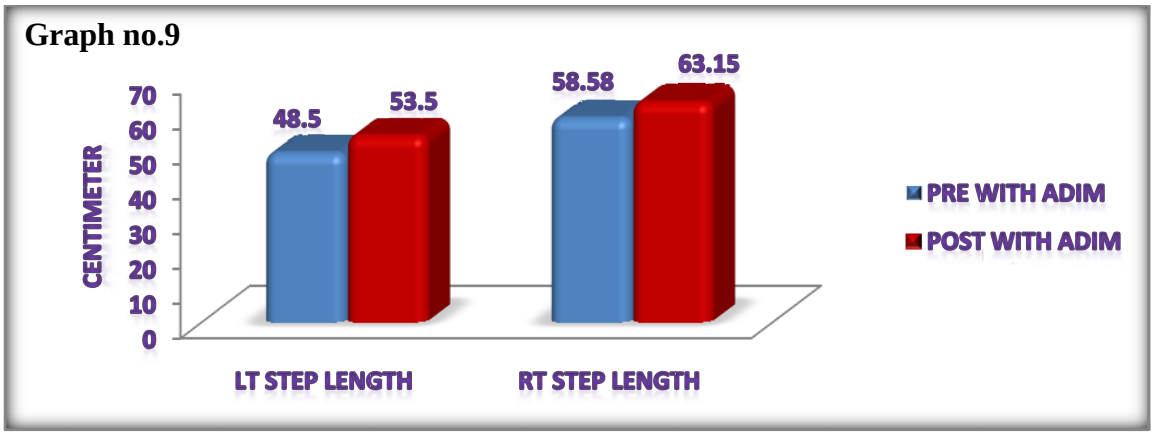
Paired 'T' test for (Group-A) Without Abdominal Drawing In Maneuver



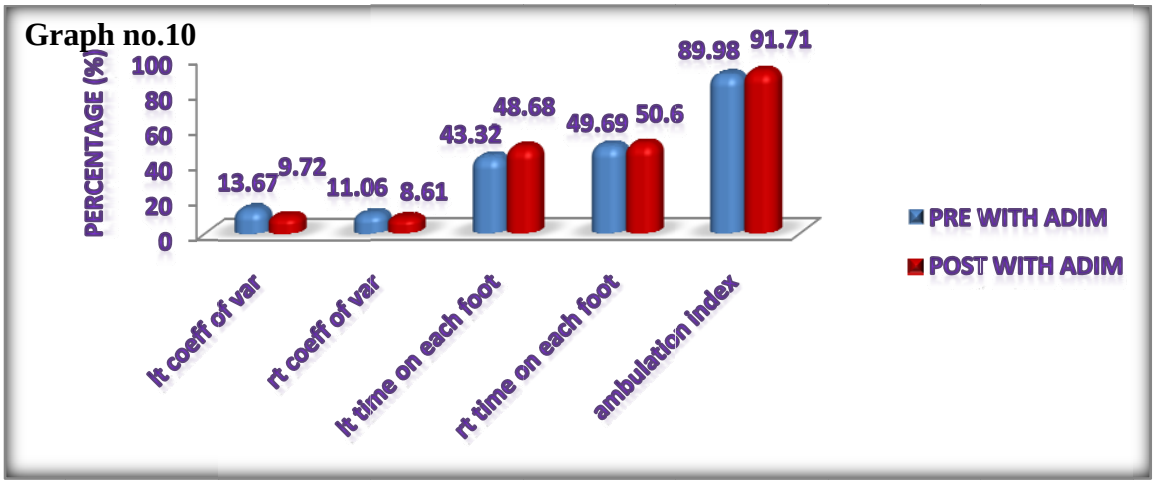
Paired 't' test for Step Cycle with Abdominal Drawing In Maneuver in (Group-B)



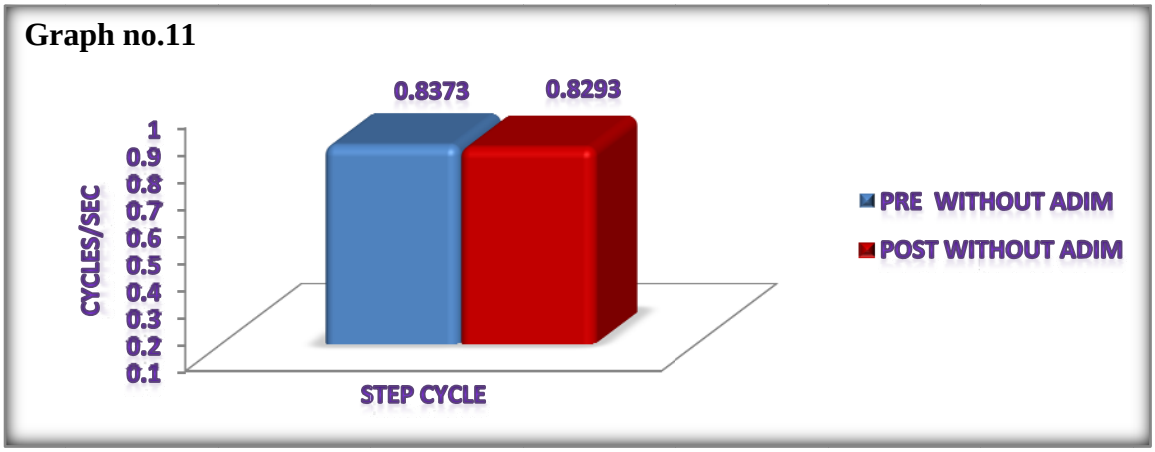
Paired 't' test for step length with Abdominal Drawing In Maneuver in (Group-B)



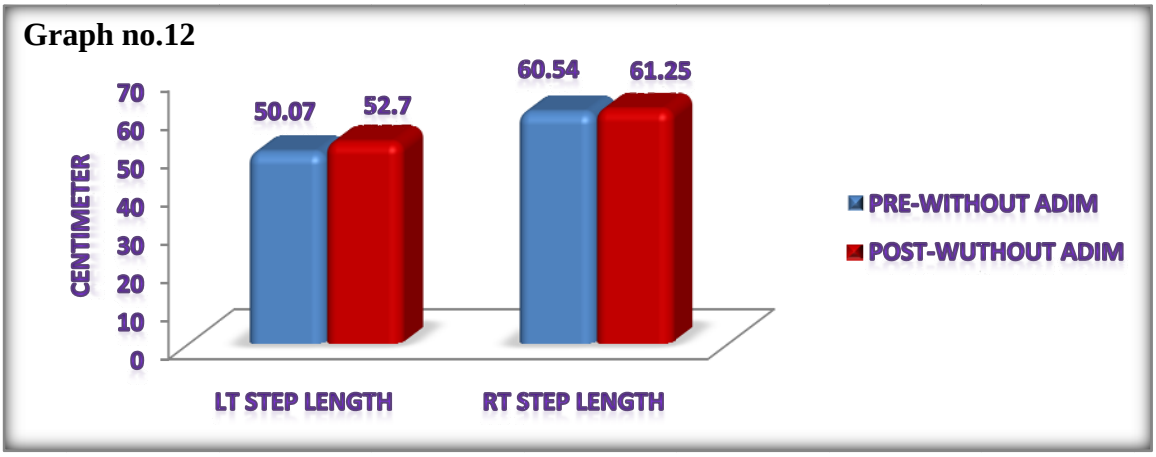
Paired 't' test for Control Group (Group-B) With Abdominal Drawing In Maneuver



Paired 't' test for Step Cycle without Abdominal Drawing In Maneuver in (Group-B)

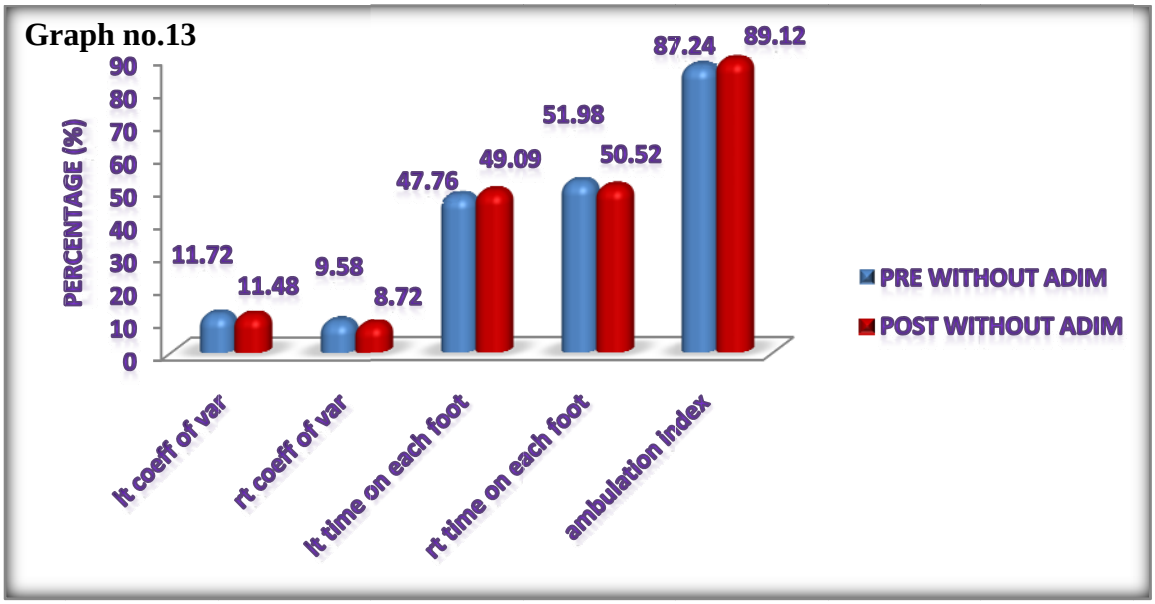


Paired 't' test for Step Length without Abdominal Drawing In Maneuver in (Group-B)



Paired ‘t’ test for (Group-A) Without Abdominal Drawing In Maneuver

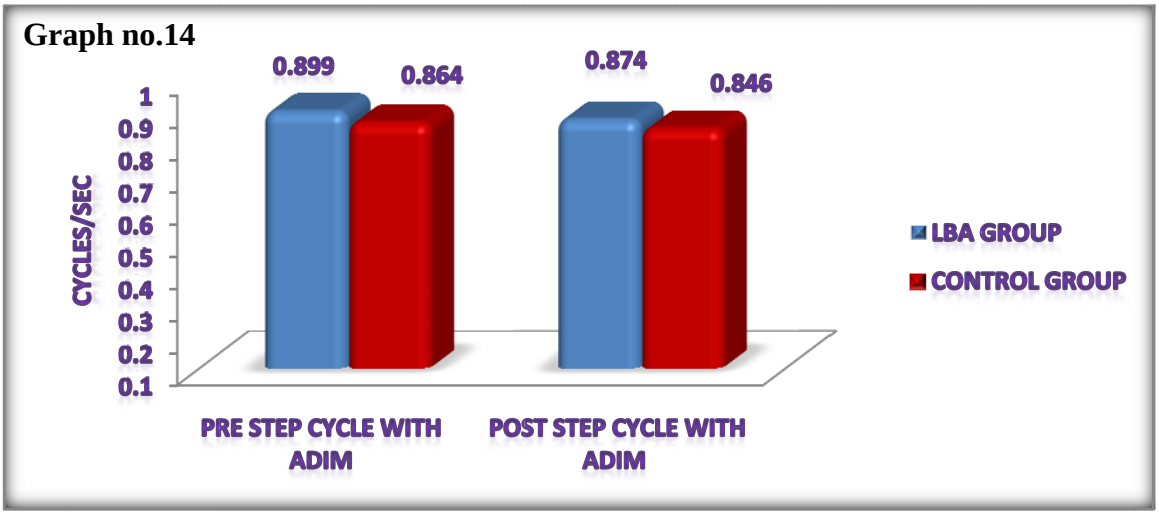
Graph no.13



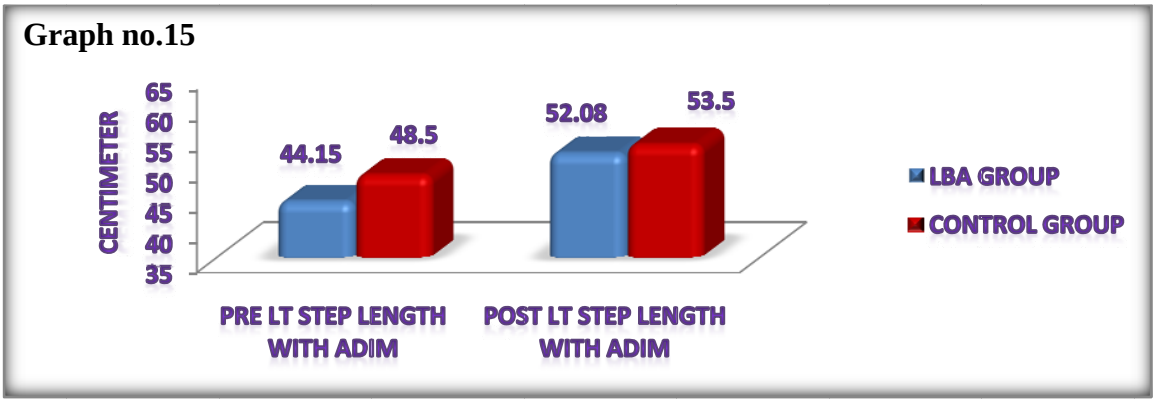
7.2.2 INDEPENDENT ‘t’ TEST

Pre test and Post test values for Group A and Group B with Abdominal Drawing In Maneuver for Step Cycle

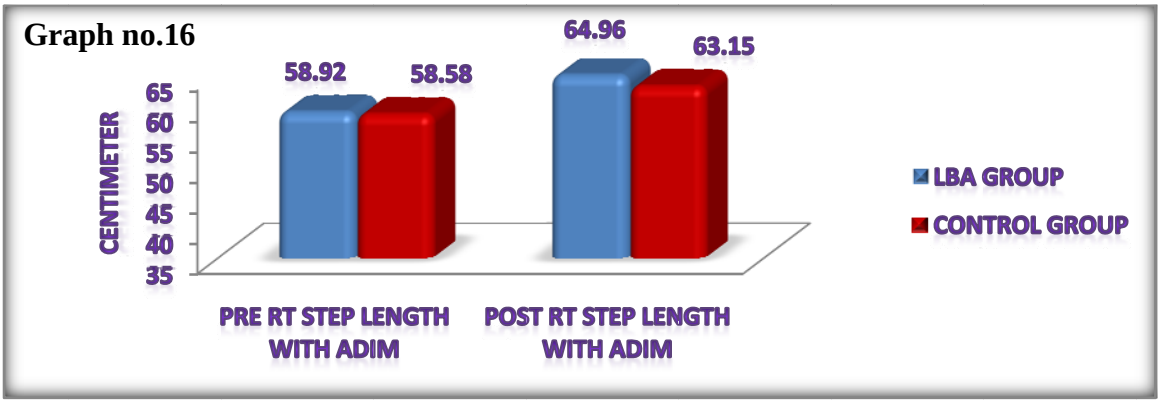
Graph no.14



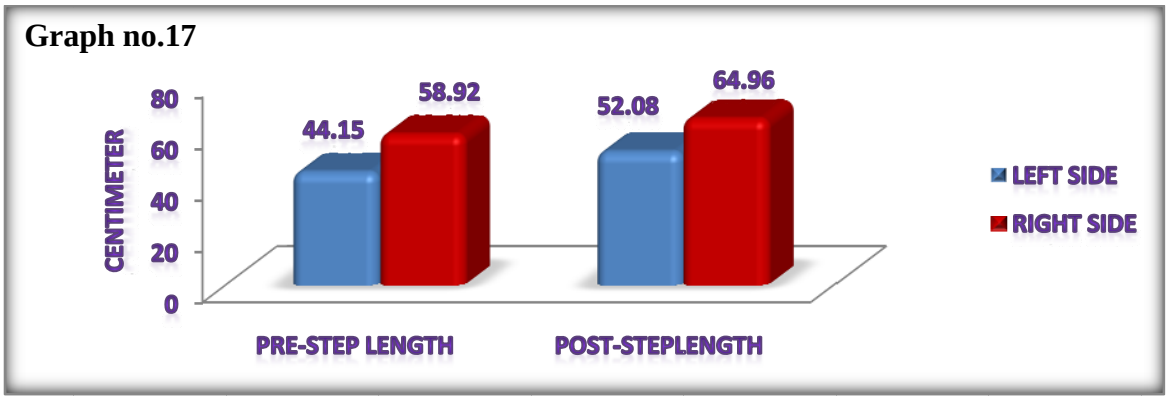
Pre test and Post test values for Group A and Group B with Abdominal Drawing In Maneuver for Step Length (left side)



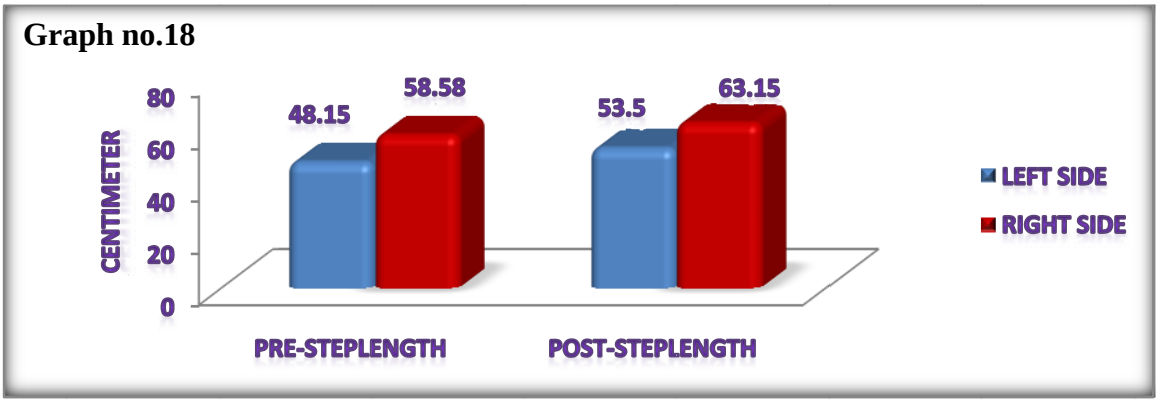
Pre test and Post test values for Group A and Group B with Abdominal Drawing In Maneuver for Step Length (right side)



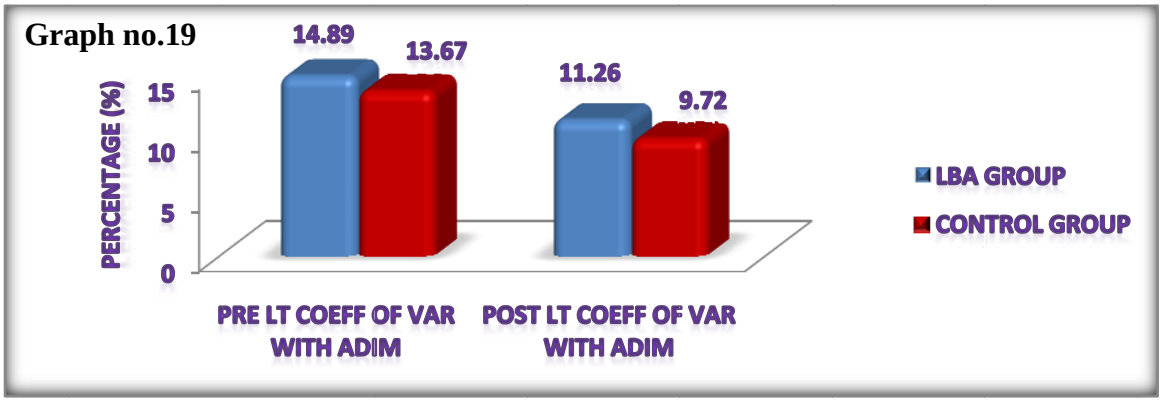
Pre test and Post test values for Group A with Abdominal Drawing In Maneuver for Step Length (left side and right side)



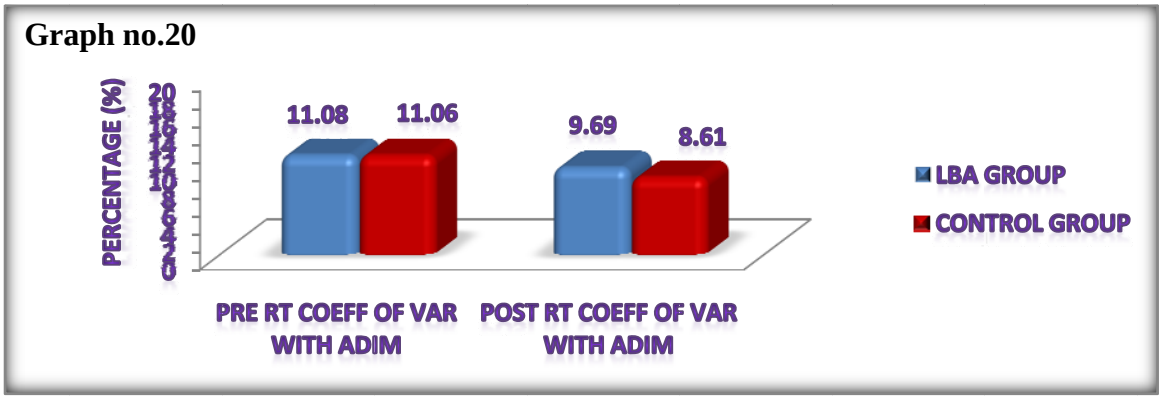
Pre test and Post test values for Group B with Abdominal Drawing In Maneuver for Step Length (left side and right side)



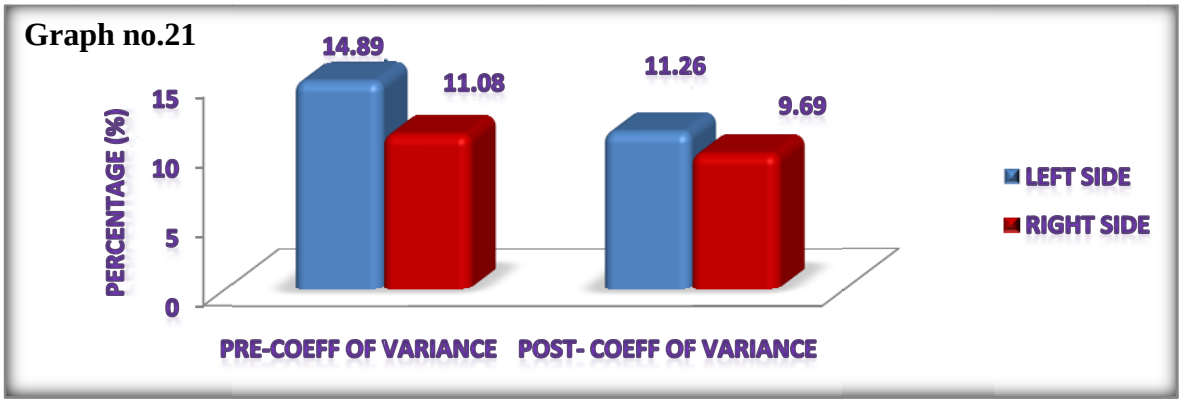
Pre test and Post test values for Group A and Group B with Abdominal Drawing In Maneuver for coefficient of variance (left)



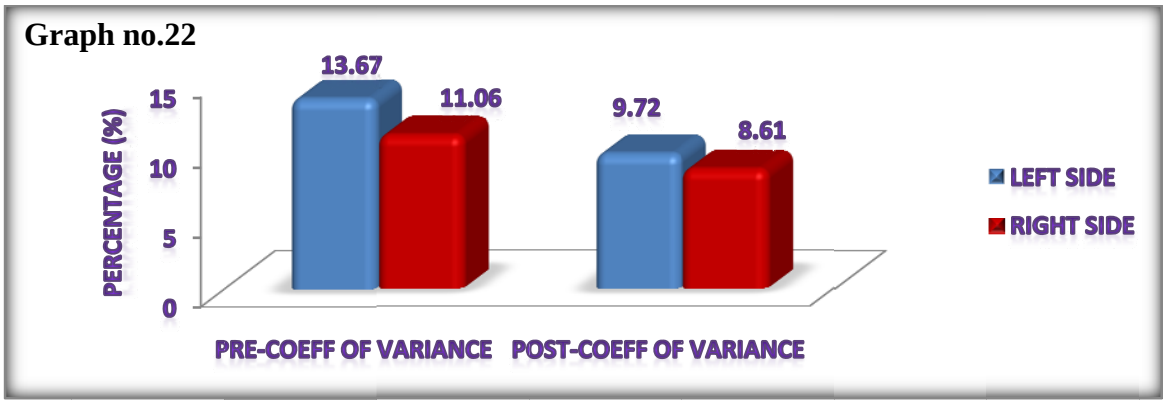
Pre test and Post test values for Group A and Group B with Abdominal Drawing In Maneuver for coefficient of variance (right)



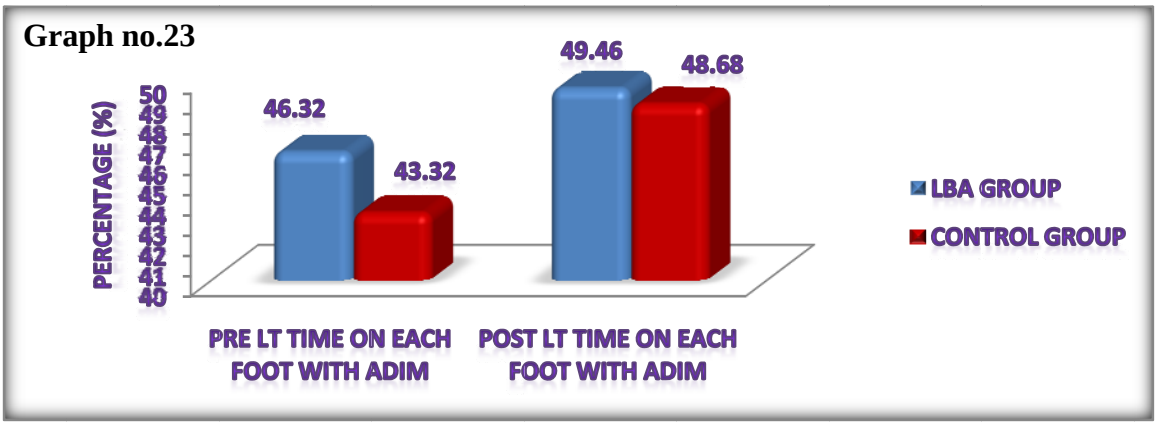
Pre test and Post test values for Group A with Abdominal Drawing In Maneuver for coefficient of variance (left side and right side)



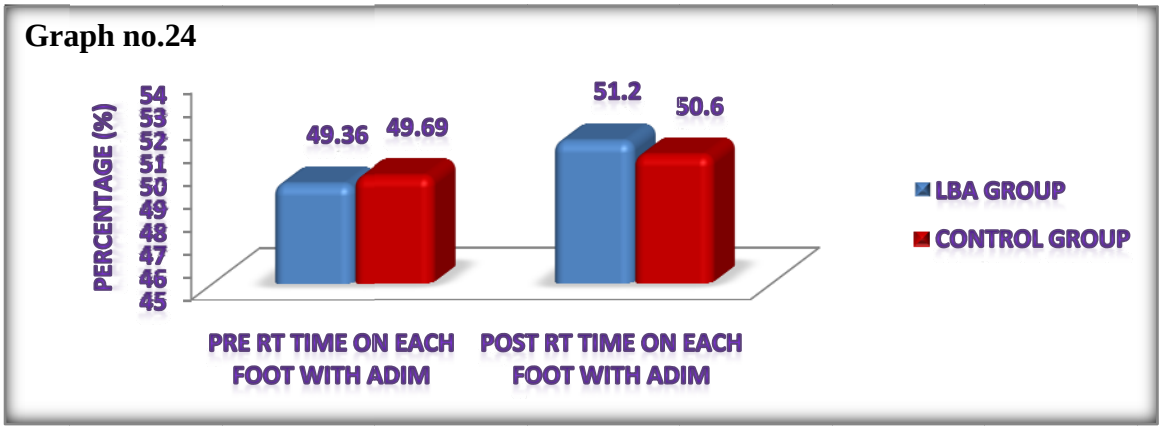
Pre test and Post test values for Group B with Abdominal Drawing In Maneuver for coefficient of variance (left side and right side)



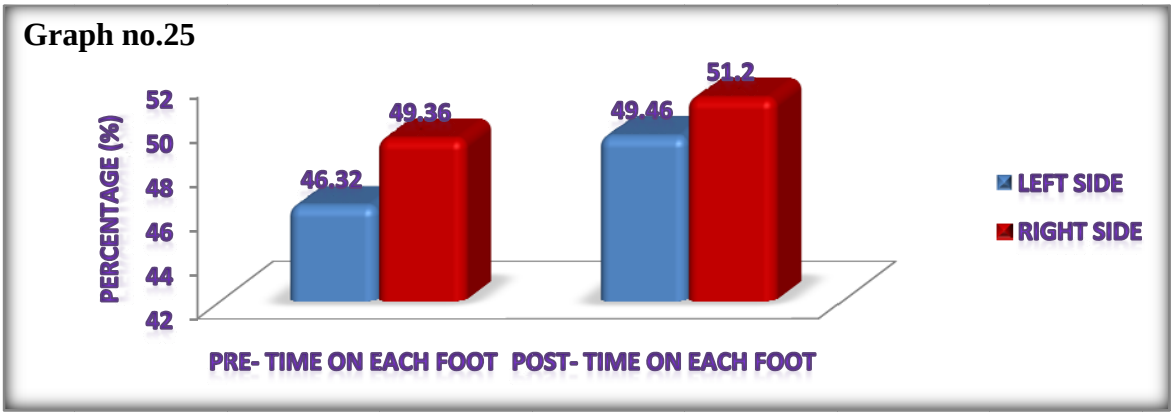
Pre test and Post test values for Group A and Group B with Abdominal Drawing In Maneuver for time on each foot (left)



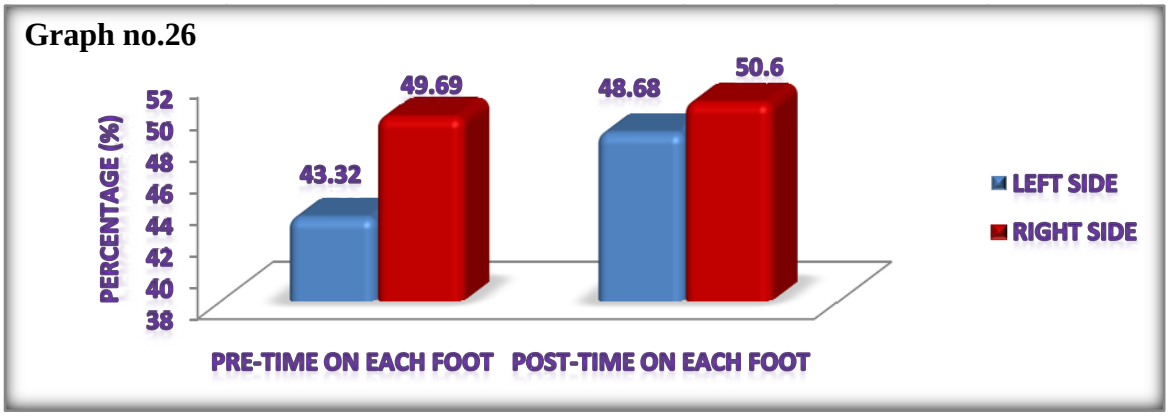
Pre test and Post test values for Group A and Group B with Abdominal Drawing In Maneuver for time on each foot (right)



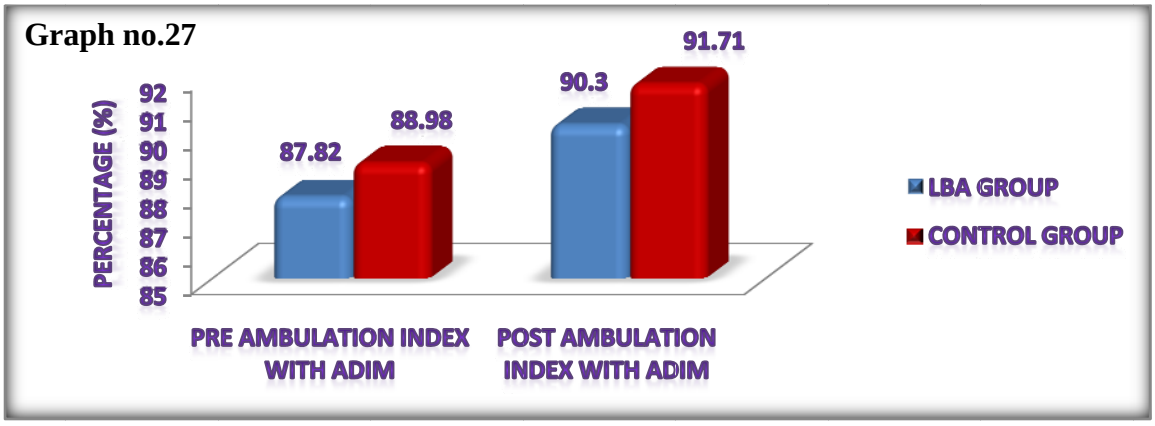
Pre test and Post test values for Group A with Abdominal Drawing In Maneuver for time on each foot (left side and right side)



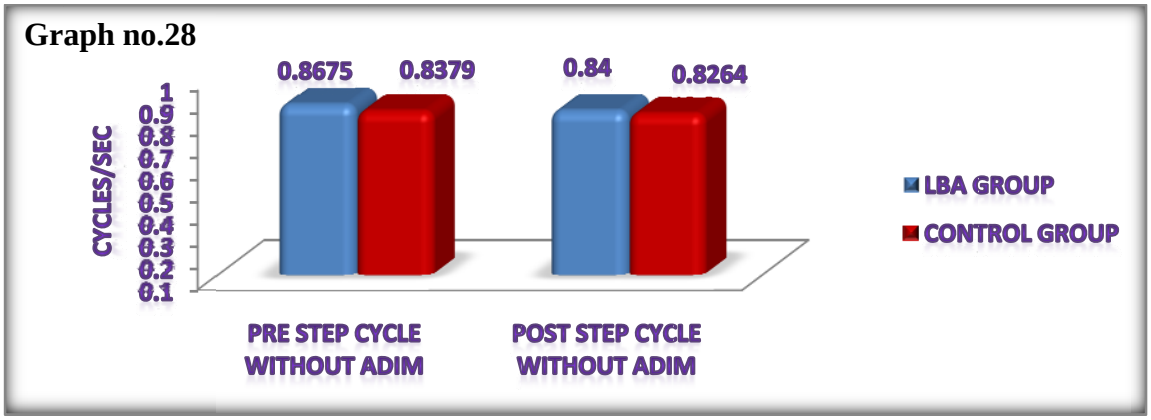
Pre test and Post test values for Group B with Abdominal Drawing In Maneuver for time on each foot (left side and right side)



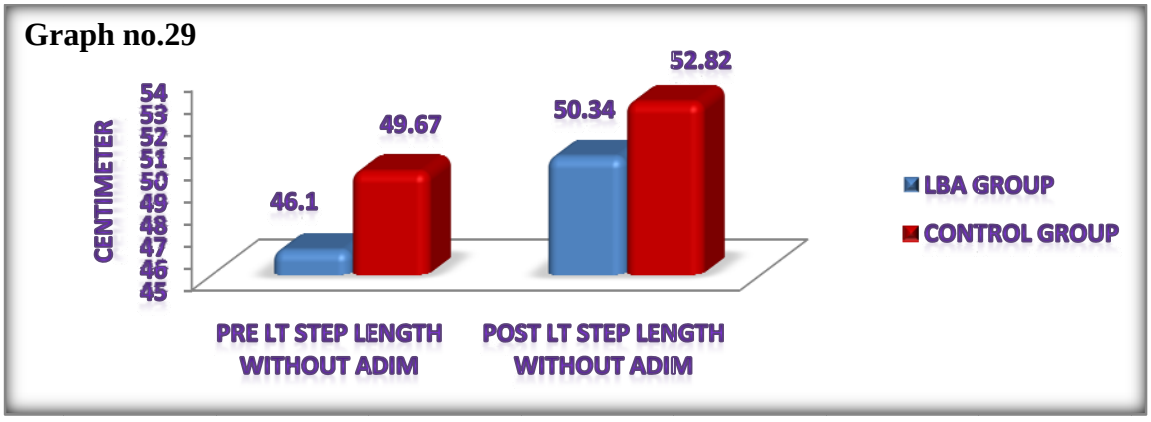
Pre test and Post test values for Group A and Group B with Abdominal Drawing In Maneuver for Ambulation index



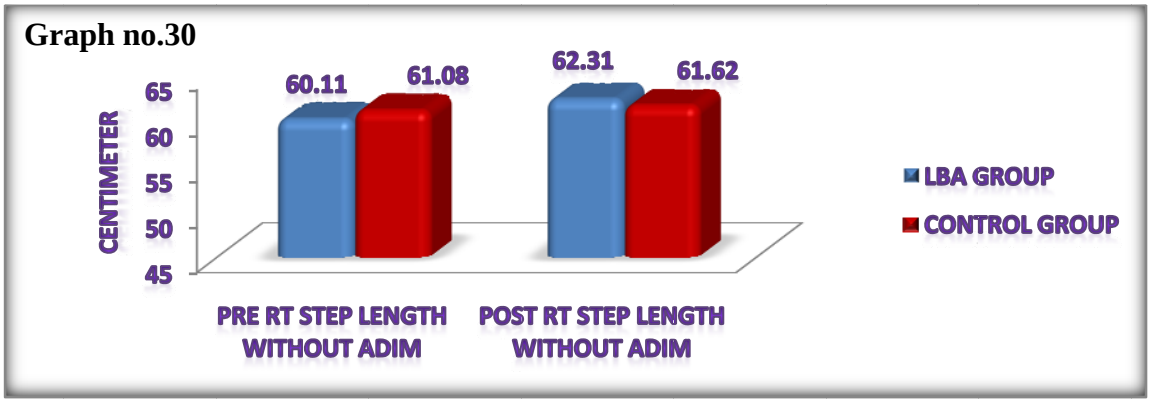
Pre test and Post test values for Group A and Group B without Abdominal Drawing In Maneuver for Step Cycle



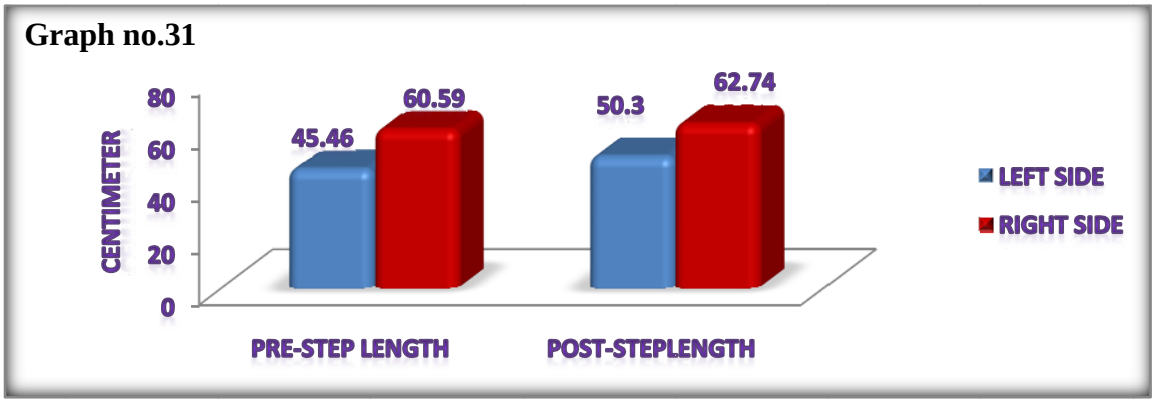
Pre test and Post test values for Group A and Group B without Abdominal Drawing In Maneuver for Step Length (left side)



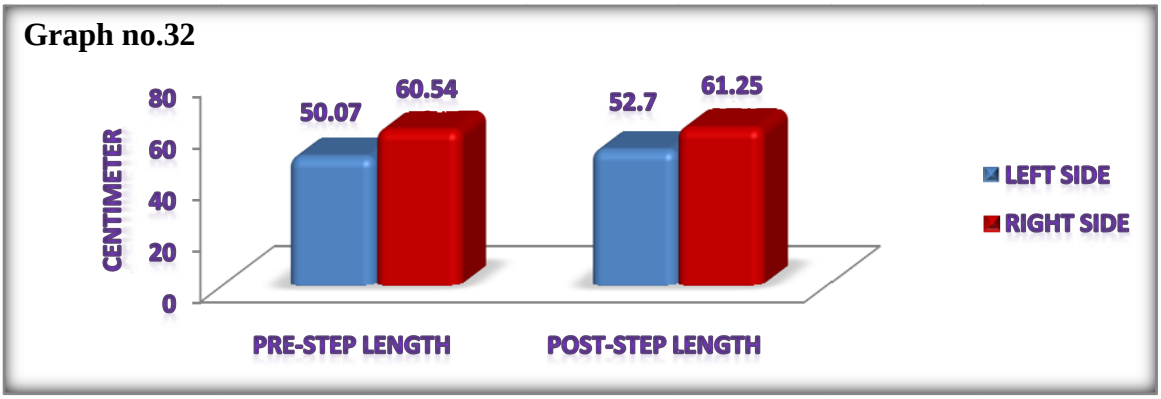
Pre test and Post test values for Group A and Group B without Abdominal Drawing In Maneuver for Step Length (right side)



Pre test and Post test values for Group A without Abdominal Drawing In Maneuver for Step Length (left side and right side)

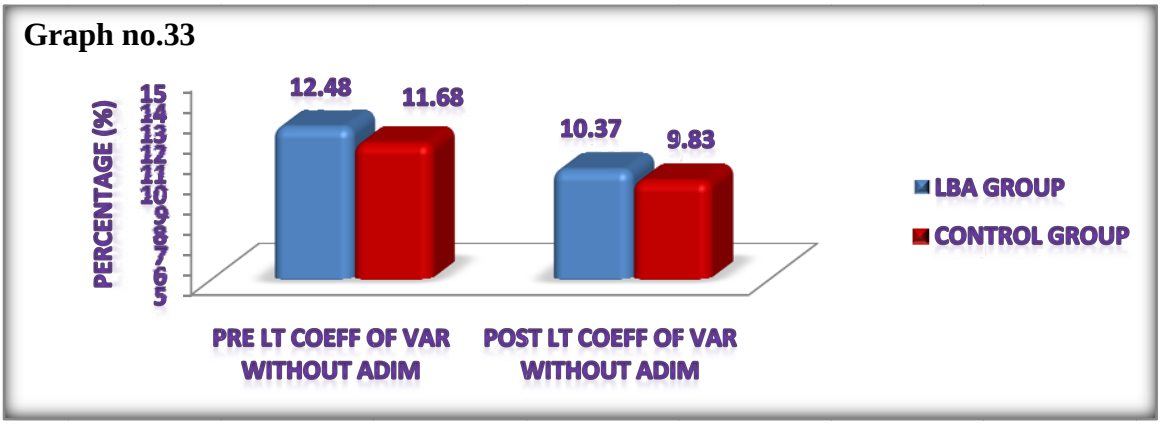


Pre test and Post test values for Group B without Abdominal Drawing In Maneuver for Step Length (left side and right side)



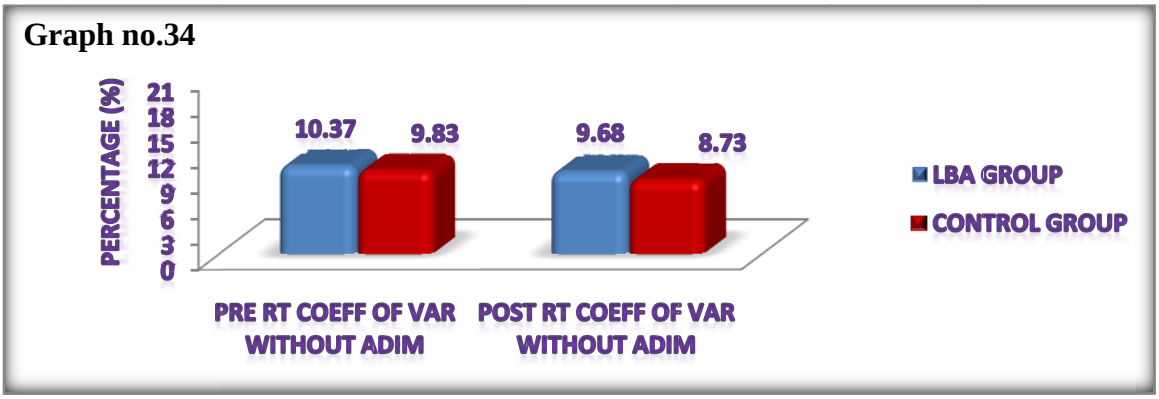
Pre test and Post test values for Group A and Group B without Abdominal Drawing In Maneuver for coefficient of variance (left)

Graph no.33



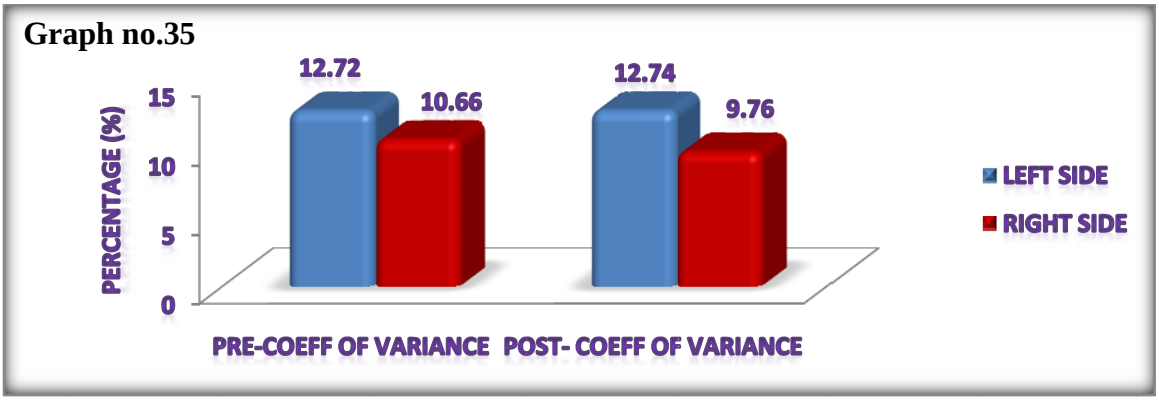
Pre test and Post test values for Group A and Group B without Abdominal Drawing In Maneuver for coefficient of variance (right)

Graph no.34



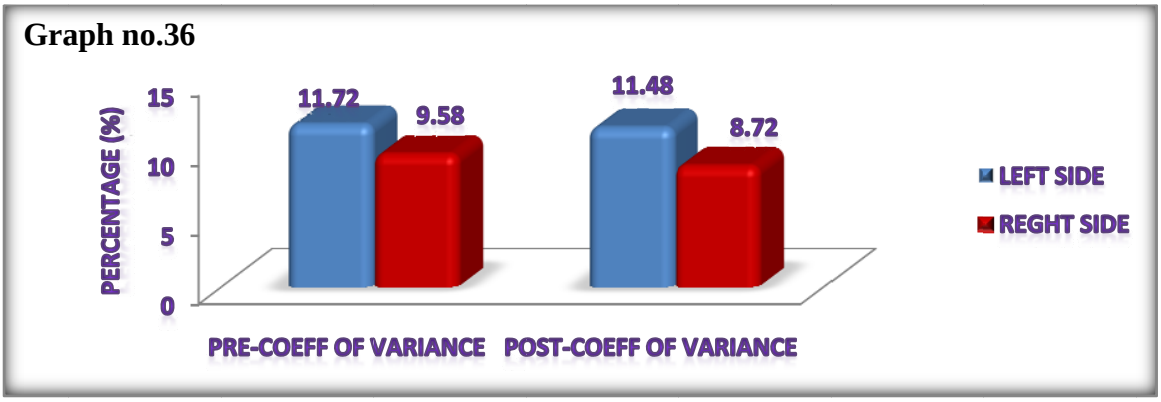
Pre test and Post test values for Group A without Abdominal Drawing In Maneuver for coefficient of variance (left side and right side)

Graph no.35



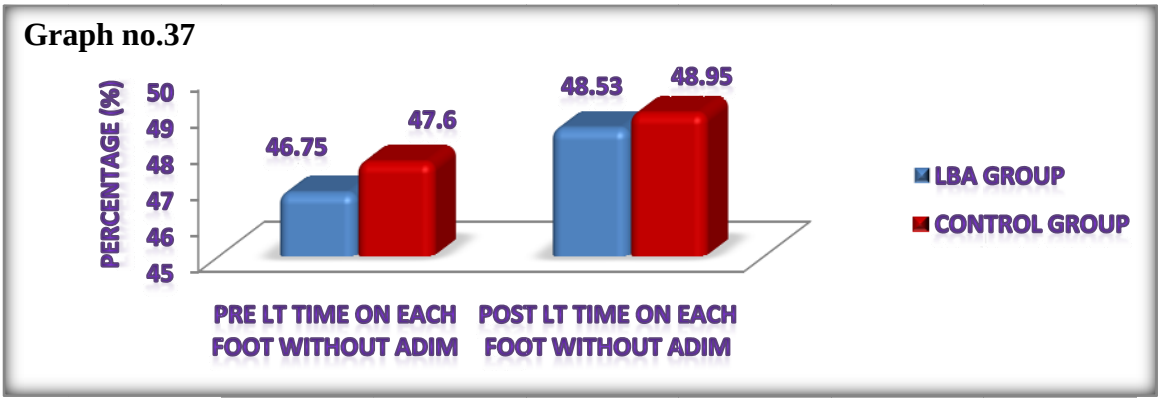
Pre test and Post test values for Group B without Abdominal Drawing In Maneuver for coefficient of variance (left side and right side)

Graph no.36



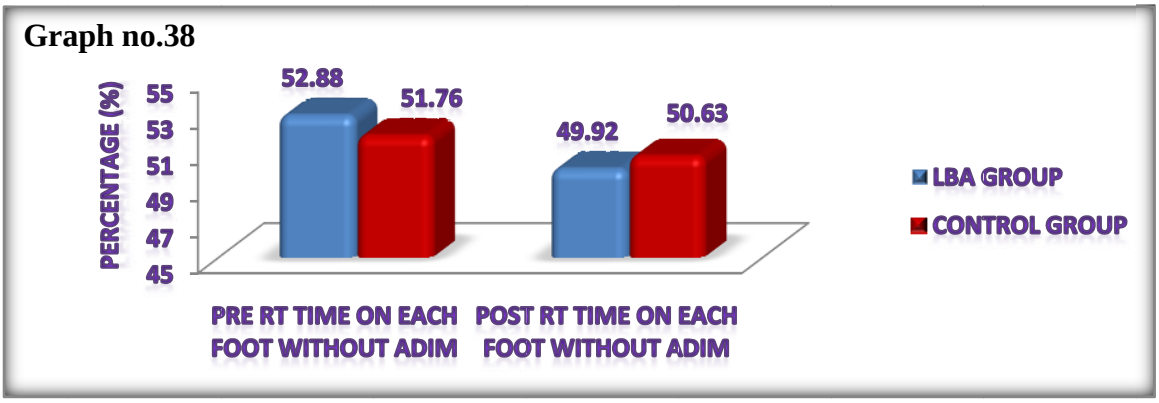
Pre test and Post test values for Group A and Group B without Abdominal Drawing In Maneuver for Time on each foot (left)

Graph no.37

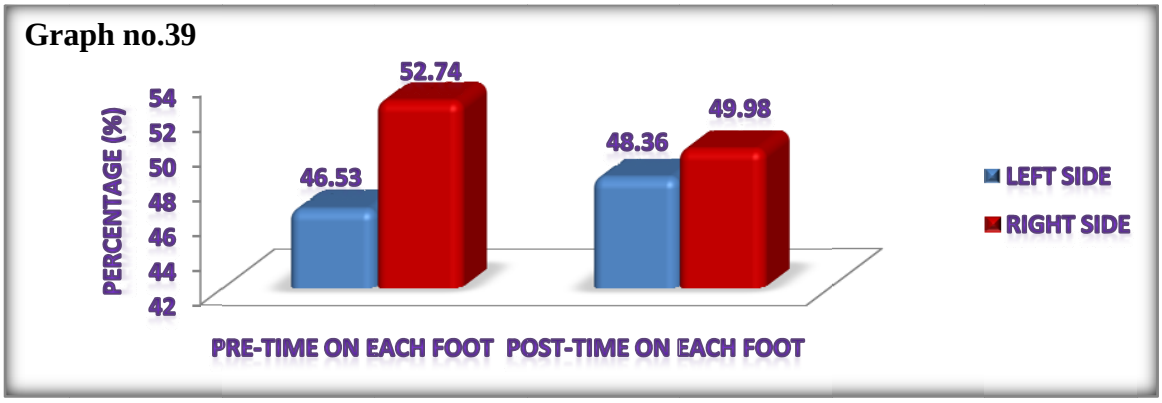


Pre test and Post test values for Group A and Group B without Abdominal Drawing In Maneuver for Time on each foot (right)

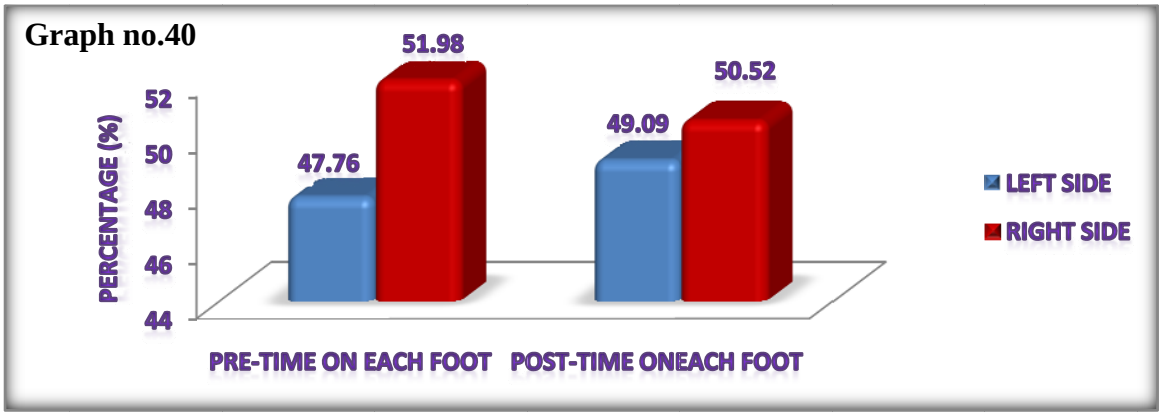
Graph no.38



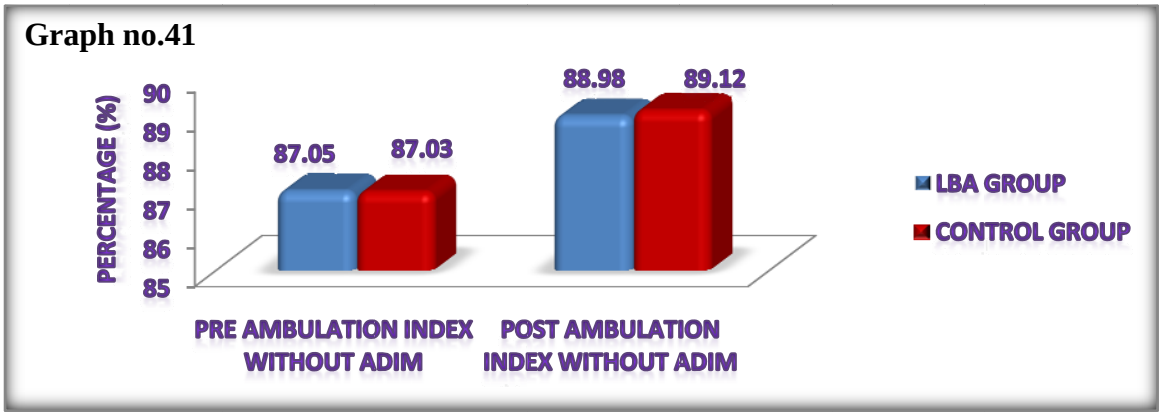
Pre test and Post test values for Group A without Abdominal Drawing In Maneuver for Time on each foot (left side and right side)



Pre test and Post test values for Group B without Abdominal Drawing In Maneuver for Time on each foot (left side and right side)



Pre test and Post test values for Group A and Group B without Abdominal Drawing In Maneuver for ambulation index



DATA ANALYSIS AND INTERPRETATION

8. DATA ANALYSIS AND INTERPRETATION

8.1 PAIRED ‘t’ TEST

Paired ‘t’ Test for Pain in Low Back Pain Group

Pre test and post test values for pain in low back pain group were analyzed by using paired ‘t’ test. At 5% level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 10.869, since calculated ‘t’ value is greater than the table ‘t’ value there is a significant difference between pre and post test values and the null hypothesis is rejected. Hence it is concluded that there is a reduction in pain. [refer table no.1]

Paired ‘t’ test for Step Cycle with Abdominal Drawing In Maneuver in (Group-A)

Pre test and post test values for Step Cycle in low back pain group were analyzed by using paired ‘t’ test. At 5% level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 1.281, since calculated ‘t’ value is less than the table ‘t’ value there is no significant difference between pre and post test values and the null hypothesis is accepted. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to reduce step cycle, thereby improving gait symmetry. [refer table no.2]

Paired ‘t’ test for average step length (left) with Abdominal Drawing In Maneuver in (Group-A)

Pre test and post test values for average step length (left) in low back pain group were analyzed by using paired ‘t’ test. At 5% level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 4.562, since calculated ‘t’ value is greater than the table ‘t’ value there is a significant difference between pre and post test values and the null hypothesis is rejected. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to improve step length, thereby improving gait symmetry. [refer table no.3]

Paired ‘t’ test for average Step length (right) with Abdominal Drawing In Maneuver in (Group-A)

Pre test and post test values for average Step length (right) in low back pain group were analyzed by using paired ‘t’ test. At 5% level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 5.193, since calculated ‘t’ value is greater than the table ‘t’ value there is a significant difference between pre and post test values and the null hypothesis is rejected. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to improve step length, thereby improving gait symmetry. [refer table no.3]

Paired ‘t’ test for Coefficient of variance (left) with Abdominal Drawing In Maneuver in (Group-A)

Pre test and post test values for Coefficient of variance (left) in low back pain group were analyzed by using paired ‘t’ test. At 5% level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 1.696, since calculated ‘t’ value is greater than the table ‘t’ value there is a significant difference between pre and post test values and the null hypothesis is accepted. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to reduce Coefficient of variance, thereby improving gait symmetry. [refer table no.4]

Paired ‘t’ test for Coefficient of variance (right) with Abdominal Drawing In Maneuver in (Group-A)

Pre test and post test values for Coefficient of variance (right) in low back pain group were analyzed by using paired ‘t’ test. At 5% level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 1.392, since calculated ‘t’ value is less than the table ‘t’ value there is no significant difference between pre and post test values and the null hypothesis is accepted. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to reduce Coefficient of variance, thereby improving gait symmetry. [refer table no.4]

Paired ‘t’ test for Time on each foot (left) with Abdominal Drawing In Maneuver in (Group-A)

Pre test and post test values for Time on each foot (left) in low back pain group were analyzed by using paired ‘t’ test. At 5% level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 3.500, since calculated ‘t’ value is greater than the table ‘t’ value there is a significant difference between pre and post test values and the null hypothesis is rejected. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to improve time on each foot , thereby improving gait symmetry. [refer table no.4]

Paired ‘t’ test for Time on each foot (right) with Abdominal Drawing In Maneuver in (Group-A)

Pre test and post test values for Time on each foot (right) in low back pain group were analyzed by using paired ‘t’ test. At 5% level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 2.161, since calculated ‘t’ value is greater than the table ‘t’ value there is a significant difference between pre and post test values and the null hypothesis is rejected. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to improve time on each foot, thereby improving gait symmetry. [refer table no.4]

Paired ‘t’ test for Ambulation index with Abdominal Drawing In Maneuver in (Group-A)

Pre test and post test values for Ambulation index in low back pain group were analyzed by using paired ‘t’ test. At 5% level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 3.223, since calculated ‘t’ value is greater than the table ‘t’ value there is a significant difference between pre and post test values and the null hypothesis is rejected. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to improve ambulation index, thereby improving gait symmetry. [refer table no.4]

Paired ‘t’ test for Step Cycle without Abdominal Drawing In Maneuver in (Group-A)

Pre test and post test values for Step Cycle in low back pain group were analyzed by using paired ‘t’ test. At 5% level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 1.812, since calculated ‘t’ value is less than the table ‘t’ value there is no significant difference between pre and post test values and the null hypothesis is accepted. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to reduce step cycle, thereby improving gait symmetry. [refer table no.5]

Paired ‘t’ test for Average step length (left) without Abdominal Drawing In Maneuver in (Group-A)

Pre test and post test values for Average step length (left) in low back pain group were analyzed by using paired ‘t’ test. At 5% level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 2.435, since calculated ‘t’ value is greater than the table ‘t’ value there is a significant difference between pre and post test values and the null hypothesis is rejected. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to improve average step length, thereby improving gait symmetry. [refer table no.6]

Paired ‘t’ test for Average step length (right) without Abdominal Drawing In Maneuver in (Group-A)

Pre test and post test values for Average step length (right) in low back pain group were analyzed by using paired ‘t’ test. At 5% level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 2.804, since calculated ‘t’ value is more than the table ‘t’ value there is a significant difference between pre and post test values and the null hypothesis is rejected. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to improve average step length, thereby improving gait symmetry. [refer table no.6]

Paired ‘t’ test for Coefficient of variance (left) without Abdominal Drawing In Maneuver in (Group-A)

Pre test and post test values for Coefficient of variance (left) in low back pain group were analyzed by using paired ‘t’ test. At 5% level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is .022, since calculated ‘t’ value is less than the table ‘t’ value there is no significant difference between pre and post test values and the null hypothesis is accepted. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to reduce coefficient of variance, thereby improving gait symmetry. [refer table no.7]

Paired ‘t’ test for Coefficient of variance (right) without Abdominal Drawing In Maneuver in (Group-A)

Pre test and post test values for Coefficient of variance (right) in low back pain group were analyzed by using paired ‘t’ test. At 5% level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is .822, since calculated ‘t’ value is less than the table ‘t’ value there is no significant difference between pre and post test values and the null hypothesis is accepted. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to reduce coefficient of variance, thereby improving gait symmetry. [refer table no.7]

Paired ‘t’ test for Time on each foot (left) without Abdominal Drawing In Maneuver in (Group-A)

Pre test and post test values for Time on each foot (left) in low back pain group were analyzed by using paired ‘t’ test. At 5% level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 2.674, since calculated ‘t’ value is greater than the table ‘t’ value there is a significant difference between pre and post test values and the null hypothesis is rejected. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to improve time on each foot, thereby improving gait symmetry. [refer table no.7]

Paired ‘t’ test for Time on each foot (right) without Abdominal Drawing In Maneuver in (Group-A)

Pre test and post test values for Time on each foot (right) in low back pain group were analyzed by using paired ‘t’ test. At 5% level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 2.206, since calculated ‘t’ value is greater than the table ‘t’ value there is a significant difference between pre and post test values and the null hypothesis is rejected. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to improve time on each foot , thereby improving gait symmetry. [refer table no.7]

Paired ‘t’ test for Ambulation index without Abdominal Drawing In Maneuver in (Group-A)

Pre test and post test values for Ambulation index in low back pain group were analyzed by using paired ‘t’ test. At 5% level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 2.529, since calculated ‘t’ value is greater than the table ‘t’ value there is a significant difference between pre and post test values and the null hypothesis is rejected. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to improve ambulation index, thereby improving gait symmetry. [refer table no.7]

Paired ‘t’ test for Step Cycle with Abdominal Drawing In Maneuver in (Group-B)

Pre test and post test values for Step Cycle in Control group were analyzed by using paired ‘t’ test. At 5%level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 1.821, since calculated ‘t’ value is less than the table ‘t’ value there is no significant difference between pre and post test values and the null hypothesis is accepted. Hence it confirms the efficiency of Abdominal Drawing in Maneuver to reduce step cycle, thereby improving gait symmetry. [refer table no.8]

Paired ‘t’ test for average step length (left) with Abdominal Drawing In Maneuver in (Group-B)

Pre test and post test values for average step length (left) in control group were analyzed by using paired ‘t’ test. At 5% level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 5.639, since calculated ‘t’ value is greater than the table ‘t’ value there is a significant difference between pre and post test values and the null hypothesis is rejected. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to improve step length, thereby improving gait symmetry. [refer table no.9]

Paired ‘t’ test for average Step length (right) with Abdominal Drawing In Maneuver in (Group-B)

Pre test and post test values for average Step length (right) in control group were analyzed by using paired ‘t’ test. At 5% level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 3.610, since calculated ‘t’ value is greater than the table ‘t’ value there is a significant difference between pre and post test values and the null hypothesis is rejected. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to improve step length, thereby improving gait symmetry. [refer table no.9]

Paired ‘t’ test for Coefficient of variance (left) with Abdominal Drawing In Maneuver in (Group-B)

Pre test and post test values for Coefficient of variance (left) in control group were analyzed by using paired ‘t’ test. At 5%level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 4.732, since calculated ‘t’ value is greater than the table ‘t’ value there is a significant difference between pre and post test values and the null hypothesis is rejected. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to reduce coefficient of variance, thereby improving gait symmetry. [refer table no.10]

Paired ‘t’ test for Coefficient of variance (right) with Abdominal Drawing In Maneuver in (Group-B)

Pre test and post test values for Coefficient of variance (right) in control group were analyzed by using paired ‘t’ test. At 5% level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 2.429, since calculated ‘t’ value is less than the table ‘t’ value there is no significant difference between pre and post test values and the null hypothesis is accepted. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to reduce coefficient of variance, thereby improving gait symmetry. [refer table no.10]

Paired ‘t’ test for Time on each foot (left) with Abdominal Drawing In Maneuver in (Group-B)

Pre test and post test values for Time on each foot (left) in control group were analyzed by using paired ‘t’ test. At 5% level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 3.867, since calculated ‘t’ value is greater than the table ‘t’ value there is a significant difference between pre and post test values and the null hypothesis is rejected. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to improve time on each foot, thereby improving gait symmetry. [refer table no.10]

Paired ‘t’ test for Time on each foot (right) with Abdominal Drawing In Maneuver in (Group-B)

Pre test and post test values for Time on each foot (right) in control group were analyzed by using paired ‘t’ test. At 5%level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 2.509, since calculated ‘t’ value is greater than the table ‘t’ value there is a significant difference between pre and post test values and the null hypothesis is rejected. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to improve time on each foot, thereby improving gait symmetry. [refer table no.10]

Paired ‘t’ test for Ambulation index with Abdominal Drawing In Maneuver in (Group-B)

Pre test and post test values for Ambulation index in control group were analyzed by using paired ‘t’ test. At 5%level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 3.562, since calculated ‘t’ value is greater than the table ‘t’ value there is a significant difference between pre and post test values and the null hypothesis is rejected. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to improve ambulation index, thereby improving gait symmetry. [refer table no.10]

Paired ‘t’ test for Step Cycle without Abdominal Drawing In Maneuver in (Group-B)

Pre test and post test values for Step Cycle in control group were analyzed by using paired ‘t’ test. At 5%level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is .757, since calculated ‘t’ value is less than the table ‘t’ value there is no significant difference between pre and post test values and the null hypothesis is accepted. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to reduce step cycle, thereby improving gait symmetry. [refer table no.11]

Paired ‘t’ test for Average step length (left) without Abdominal Drawing In Maneuver in (Group-B)

Pre test and post test values for Average step length (left) in control group were analyzed by using paired ‘t’ test. At 5%level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 2.715 , since calculated ‘t’ value is greater than the table ‘t’ value there is a significant difference between pre and post test values and the null hypothesis is rejected. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to improve step length, thereby improving gait symmetry. [refer table no.12]

Paired ‘t’ test for Average step length (right) without Abdominal Drawing In Maneuver in (Group-B)

Pre test and post test values for Average step length (right) in control group were analyzed by using paired ‘t’ test. At 5%level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is .697, since calculated ‘t’ value is less than the table ‘t’ value there is no significant difference between pre and post test values and the null hypothesis is accepted. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to improve step length, thereby improving gait symmetry. [refer table no.12]

Paired ‘t’ test for Coefficient of variance (left) without Abdominal Drawing In Maneuver in (Group-B)

Pre test and post test values for Coefficient of variance (left) in control group were analyzed by using paired ‘t’ test. At 5%level of significance for 14 degrees of freedom , the table value is 2.145 and the calculated value is .283, since calculated ‘t’ value is less than the table ‘t’ value there is no significant difference between pre and post test values and the null hypothesis is accepted. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to reduce coefficient of variance, thereby improving gait symmetry. [refer table no.13]

Paired ‘t’ test for Coefficient of variance (right) without Abdominal Drawing In Maneuver in (Group-B)

Pre test and post test values for Coefficient of variance (right) in control group were analyzed by using paired ‘t’ test. At 5%level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 1.283, since calculated ‘t’ value is less than the table ‘t’ value there is no significant difference between pre and post test values and the null hypothesis is accepted. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to reduce coefficient of variance, thereby improving gait symmetry. [refer table no.13]

Paired ‘t’ test for Time on each foot (left) without Abdominal Drawing In Maneuver in (Group-B)

Pre test and post test values for Time on each foot (left) in control group were analyzed by using paired ‘t’ test. At 5%level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 3.533, since calculated ‘t’ value is greater than the table ‘t’ value there is a significant difference between pre and post test values and the null hypothesis is rejected. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to improve time on each foot, thereby improving gait symmetry. [refer table no.13]

Paired ‘t’ test for Time on each foot (right) without Abdominal Drawing In Maneuver in (Group-B)

Pre test and post test values for Time on each foot (right) in control group were analyzed by using paired ‘t’ test. At 5%level of significance for 14 degrees of freedom , the table value is 2.145 and the calculated value is 3.198, since calculated ‘t’ value is greater than the table ‘t’ value there is a significant difference between pre and post test values and the null hypothesis is rejected. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to improve time on each foot, thereby improving gait symmetry. [refer table no.13]

Paired ‘t’ test for Ambulation index without Abdominal Drawing In Maneuver in (Group-B)

Pre test and post test values for Ambulation index in control group were analyzed by using paired ‘t’ test. At 5%level of significance for 14 degrees of freedom, the table value is 2.145 and the calculated value is 2.672, since calculated ‘t’ value is greater than the table ‘t’ value there is a significant difference between pre and post test values and the null hypothesis is rejected. Hence it confirms the efficiency of Abdominal Drawing In Maneuver to improve ambulation index, thereby improving gait symmetry. [refer table no.13]

8.2 INDEPENDENT ‘t’ TEST

Pre test and Post test values for Group A and Group B with Abdominal Drawing In Maneuver for Step Cycle

Pre test and post test values for step cycle in group - A and group - B were analyzed by using independent ‘t’ test. At 5% level of significance for 28 degrees of freedom the table ‘t’ value is 2.048 and the calculated ‘t’ value for pre test is 1.781 and post test is 1.293 since calculated ‘t’ value is less than the table ‘t’ value, it shows that the null hypothesis is accepted. Hence it is concluded that there is no significant difference exists between pre test and post test values of group - A and group – B. [refer table no.14]

Pre test and Post test values for Group A and Group B with Abdominal Drawing In Maneuver for Step Length (left side)

Pre test and post test values for Step Length (left side) in group - A and group - B were analyzed by using independent ‘t’ test. At 5% level of significance for 28 degrees of freedom the table ‘t’ value is 2.048 and the calculated ‘t’ value for pre test is 1.633 and post test is .947 since calculated ‘t’ value is less than the table ‘t’ value, it shows that the null hypothesis is accepted. Hence it is concluded that there is no significant difference exists between pre test and post test values of group - A and group – B. [refer table no.15]

Pre test and Post test values for Group A and Group B with Abdominal Drawing In Maneuver for Step Length (right side)

Pre test and post test values for Step Length (right side) in group - A and group - B were analyzed by using independent ‘t’ test. At 5% level of significance for 28 degrees of freedom the table ‘t’ value is 2.048 and the calculated ‘t’ value for pre test is .199 and post test is .975 since calculated ‘t’ value is less than the table ‘t’ value, it shows that the null hypothesis is accepted. Hence it is concluded that there is no significant difference exists between pre test and post test values of group - A and group - B. [refer table no.16]

Pre test and Post test values for Group A with Abdominal Drawing In Maneuver for Step Length (left side and right side)

Pre test and post test values for step length(left and right) in group - A were analyzed by using independent ‘t’ test. At 5% level of significance for 28 degrees of freedom the table ‘t’ value is 2.048 and the calculated ‘t’ value for pretest is 7.053 and posttest is 6.522 since calculated ‘t’ value is greater than the table ‘t’ value it shows that the null hypothesis is rejected. Hence it is concluded that there is significant difference exists between left and right pre test and post test values of group – A. [refer table no.17]

Pre test and post test values for Group B with Abdominal Drawing In Maneuver for Step Length (left side and right side)

Pre test and post test values for step length(left and right) in group - B were analyzed by using independent ‘t’ test. At 5% level of significance for 28 degrees of freedom the table ‘t’ value is 2.048 and the calculated ‘t’ value for pre test is 8.986 and post test is 7.192 since calculated ‘t’ value is greater than the table ‘t’ value it shows that the null hypothesis is rejected. Hence it is concluded that there is significant difference exists between left and right pre test and post test values of group - B. [refer table no.18]

Pre test and post test values for Group A and Group B with Abdominal Drawing In Maneuver for coefficient of variance (left)

Pre test and post test values for coefficient of variance (left) in group - A and group - B were analyzed by using independent ‘t’ test. At 5% level of significance for 28 degrees of freedom the table ‘t’ value is 2.048 and the calculated ‘t’ value for pre test is 1.151and post test is 1.119 since calculated ‘t’ value is less than the table ‘t’ value it shows that the null hypothesis is accepted. Hence it is concluded that there is no significant difference exists between pre test and post test values of group - A and group - B. [refer table no.19]

Pre test and post test values for Group A and Group B with Abdominal Drawing In Maneuver for coefficient of variance (right)

Pre test and post test values for coefficient of variance (right) in group - A and group - B were analyzed by using independent 't' test. At 5% level of significance for 28 degrees of freedom the table 't' value is 2.048 and the calculated 't' value for pre test is .016 and post test is 1.160 since calculated 't' value is less than the table 't' value it shows that the null hypothesis is accepted. Hence it is concluded that there is no significant difference exists between pre test and post test values of group - A and group - B. [refer table no.20]

Pre test and post test values for Group A with Abdominal Drawing In Maneuver for coefficient of variance (left side and right side)

Pre test and post test values for coefficient of variance (left and right) in group - A were analyzed by using independent 't' test. At 5% level of significance for 28 degrees of freedom the table 't' value is 2.048 and the calculated 't' value for pre test is 3.378 since calculated 't' value is greater than the table 't' value it shows that the null hypothesis is accepted. Hence it is concluded that there is a significant difference exists between pre test values of group - A and 't' value for post test is 1.312 since calculated 't' value is less than the table 't' value it shows that the null hypothesis is rejected. Hence it is concluded that there is no significant difference exists between post test values of group – A. [refer table no.21]

Pre test and post test values for Group B with Abdominal Drawing In Maneuver for coefficient of variance (left side and right side)

Pre test and post test values for coefficient of variance (left and right) in group - B were analyzed by using independent 't' test. At 5% level of significance for 28 degrees of freedom the table 't' value is 2.048 and the calculated 't' value is 2.167 since calculated 't' value is greater than the table 't' value it shows that the null hypothesis is rejected. Hence it is concluded that there is significant difference exists between left and right pre test values of group - B and that 't' value for post test is 1.072 since calculated 't' value is less than the table 't' value it shows that the null hypothesis is rejected. Hence it is concluded that there is no significant difference exists between post test values of group – B. [refer table no.22]

Pre test and post test values for Group A and Group B with Abdominal Drawing In Maneuver for time on each foot (left)

Pre test and post test values for time on each foot (left) in group - A and group - B were analyzed by using independent ‘t’ test. At 5% level of significance for 28 degrees of freedom the table ‘t’ value is 2.048 and the calculated ‘t’ value for pre test is 2.015 and post test is 1.199 since calculated ‘t’ value is less than the table ‘t’ value it shows that the null hypothesis is accepted. Hence it is concluded that there is no significant difference exists between pre test and post test values of group - A and group - B. [refer table no.23]

Pre test and post test values for Group A and Group B with Abdominal Drawing In Maneuver for time on each foot (right)

Pre test values for time on each foot (right) in group - A and group - B were analyzed by using independent ‘t’ test. At 5% level of significance for 28 degrees of freedom the table ‘t’ value is 2.048 and the calculated ‘t’ value for pre test is .394 and post test is .926 since calculated ‘t’ value is less than the table ‘t’ value it shows that the null hypothesis is accepted. Hence it is concluded that there is no significant difference exists between pre test and post test values of group - A and group - B. [refer table no.24]

Pre test and post test values for Group A with Abdominal Drawing In Maneuver for time on each foot (left side and right side)

Pre test and post test values for time on each foot (left and right) in group - A were analyzed by using independent ‘t’ test. At 5% level of significance for 28 degrees of freedom the table ‘t’ value is 2.048 and the calculated ‘t’ value for pre test is 2.702 and post test is 2.601 since calculated ‘t’ value is greater than the table ‘t’ value it shows that the null hypothesis is rejected. Hence it is concluded that there is significant difference exists between left and right pre test and post test values of group - A . [refer table no.25]

Pre test and post test values for Group B with Abdominal Drawing In Maneuver for time on each foot (left side and right side)

Pre test and post test values for time on each foot (left and right) in group - B were analyzed by using independent ‘t’ test. At 5% level of significance for 28 degrees of freedom the table ‘t’ value is 2.048 and the calculated ‘t’ value for pre test is 4.913 and post test is 3.030 since calculated ‘t’ value is greater than the table ‘t’ value it shows that the null hypothesis is rejected. Hence it is concluded that there is significant difference exists between left and right pre test and post test values of group - B . [refer table no.26]

Pre test and post test values for Group A and Group B with Abdominal Drawing In Maneuver for Ambulation index

Pre test and post test values for ambulation index in group - A and group - B were analyzed by using independent ‘t’ test. At 5% level of significance for 28 degrees of freedom the table ‘t’ value is 2.048 and the calculated ‘t’ value for pre test is 1.247 and post test is 1.418 since calculated ‘t’ value is less than the table ‘t’ value it shows that the null hypothesis is accepted. Hence it is concluded that there is no significant difference exists between pre test and post test values of group - A and group - B. [refer table no.27]

Pre test and post test values for Group A and Group B without Abdominal Drawing In Maneuver for Step Cycle

Pre test and post test values for step cycle in group - A and group - B were analyzed by using independent ‘t’ test. At 5% level of significance for 28 degrees of freedom the table ‘t’ value is 2.048 and the calculated ‘t’ value is for pre test is 1.374 and post test is .709 since calculated ‘t’ value is less than the table ‘t’ value it shows that the null hypothesis is accepted. Hence it is concluded that there is no significant difference exists between pre test and post test values of group - A and group - B. [refer table no.28]

Pre test and post test values for Group A and Group B without Abdominal Drawing In Maneuver for Step Length (left side)

Pre test and post test values for Step Length (left side) in group - A and group - B were analyzed by using independent 't' test. At 5% level of significance for 28 degrees of freedom the table 't' value is 2.048 and the calculated 't' value for pre test is 1.754 and post test is 1.846 since calculated 't' value is less than the table 't' value it shows that the null hypothesis is accepted. Hence it is concluded that there is no significant difference exists between pre test and post test values of group - A and group - B. [refer table no.29]

Pre test and post test values for Group A and Group B without Abdominal Drawing In Maneuver for Step Length (right side)

Pre test and post test values for Step Length (right side) in group - A and group - B were analyzed by using independent 't' test. At 5% level of significance for 28 degrees of freedom the table 't' value is 2.048 and the calculated 't' value for pre test is .552 and post test is .464 since calculated 't' value is less than the table 't' value it shows that the null hypothesis is accepted. Hence it is concluded that there is no significant difference exists between pre test and post test values of group - A and group - B. [refer table no.30]

Pre test and post test values for Group A without Abdominal Drawing In Maneuver for Step Length (left side and right side)

Pre test and post test values for step length (left and right) in group - A were analyzed by using independent 't' test. At 5% level of significance for 28 degrees of freedom the table 't' value is 2.048 and the calculated 't' value for pre test is 6.880 and post test is 7.291 since calculated 't' value is greater than the table 't' value it shows that the null hypothesis is rejected. Hence it is concluded that there is significant difference exists between left and right pre test and post test values of group – A. [refer table no.4]

Pre test and post test values for Group B without Abdominal Drawing In Maneuver for Step Length (left side and right side)

Pre test and post test values for step length (left and right) in group - B were analyzed by using independent ‘t’ test. At 5% level of significance for 28 degrees of freedom the table ‘t’ value is 2.048 and the calculated ‘t’ value for pre test is 7.235 and post test is 8.352 since calculated ‘t’ value is greater than the table ‘t’ value it shows that the null hypothesis is rejected. Hence it is concluded that there is significant difference exists between left and right pre test and post test values of group – B. [refer table no.32]

Pre test and post test values for Group A and Group B without Abdominal Drawing In Maneuver for coefficient of variance (left)

Pre test and post test values for coefficient of variance (left) in group - A and group - B were analyzed by using independent ‘t’ test. At 5% level of significance for 28 degrees of freedom the table ‘t’ value is 2.048 and the calculated ‘t’ value for pre test is .641and post test is .892 since calculated ‘t’ value is less than the table ‘t’ value it shows that the null hypothesis is accepted. Hence it is concluded that there is no significant difference exists between left and right pre test and post test values of group – A and group – B. [refer table no.33]

Pre test and post test values for Group A and Group B without Abdominal Drawing In Maneuver for coefficient of variance (right)

Pre test and post test values for coefficient of variance (right) in group - A and group - B were analyzed by using independent ‘t’ test. At 5% level of significance for 28 degrees of freedom the table ‘t’ value is 2.048 and the calculated ‘t’ value for pre test is .537 and post test is .986 since calculated ‘t’ value is less than the table ‘t’ value it shows that the null hypothesis is accepted. Hence it is concluded that there is no significant difference exists between left and right pre test and post test values of group – A and group – B. [refer table no.34]

Pre test and post test values for Group A without Abdominal Drawing In Maneuver for coefficient of variance (left side and right side)

Pre test and post test values for coefficient of variance (left and right) in group - A were analyzed by using independent ‘t’ test. At 5% level of significance for 28 degrees of freedom the table ‘t’ value is 2.048 and the calculated ‘t’ value for pre test is 1.790 since calculated ‘t’ value is lesser than the table ‘t’ value it shows that the null hypothesis is accepted. Hence it is concluded that there is no significant difference exists between pre test values of group - A and ‘t’ value for post test is 3.064 since calculated ‘t’ value is greater than the table ‘t’ value it shows that the null hypothesis is rejected. Hence it is concluded that there is a significant difference exists between post test values of group – A. [refer table no.35]

Pre test and post test values for Group B without Abdominal Drawing In Maneuver for coefficient of variance (left side and right side)

Pre test and post test values for coefficient of variance (left and right) in group - B were analyzed by using independent ‘t’ test. At 5% level of significance for 28 degrees of freedom the table ‘t’ value is 2.048 and the calculated ‘t’ value for pre test is 2.095 and post test is 3.199 since calculated ‘t’ value is greater than the table ‘t’ value it shows that the null hypothesis is rejected. Hence it is concluded that there is a significant difference exists between post test values of group – B. [refer table no.36]

Pre test and post test values for Group A and Group B without Abdominal Drawing In Maneuver for time on each foot (left)

Pre test and post test values for time on each foot (left) in group - A and group - B were analyzed by using independent ‘t’ test. At 5% level of significance for 28 degrees of freedom the table ‘t’ value is 2.048 and the calculated ‘t’ value for pre test is 1.220 and post test is .676 since calculated ‘t’ value is less than the table ‘t’ value it shows that the null hypothesis is accepted. Hence it is concluded that there is no significant difference exists between left and right pre test and post test values of group – A and group – B. [refer table no.37]

Pre test and post test values for Group A and Group B without Abdominal Drawing In Maneuver for time on each foot (right)

Pre test and post test values for time on each foot (right) in group - A and group - B were analyzed by using independent ‘t’ test. At 5% level of significance for 28 degrees of freedom the table ‘t’ value is 2.048 and the calculated ‘t’ value for pre test is 1.036 and post test is 1.008 since calculated ‘t’ value is less than the table ‘t’ value it shows that the null hypothesis is accepted. Hence it is concluded that there is no significant difference exists between left and right pre test and post test values of group – A and group – B. [refer table no.38]

Pre test and post test values for Group A without Abdominal Drawing In Maneuver for time on each foot (left side and right side)

Pre test and post test values for time on each foot (left and right) in group - A were analyzed by using independent ‘t’ test. At 5% level of significance for 28 degrees of freedom the table ‘t’ value is 2.048 and the calculated ‘t’ value for pre test is 5.399 and post test is 2.971 since calculated ‘t’ value is greater than the table ‘t’ value it shows that the null hypothesis is rejected. Hence it is concluded that there is a significant difference exists between post test values of group – A. [refer table no.39]

Pre test and pot test values for Group B without Abdominal Drawing In Maneuver for time on each foot (left side and right side)

Pre test and post test values for time on each foot (left and right) in group - B were analyzed by using independent ‘t’ test. At 5% level of significance for 28 degrees of freedom the table ‘t’ value is 2.048 and the calculated ‘t’ value for pre test is 7.568 and post test is 3.133 since calculated ‘t’ value is greater than the table ‘t’ value it shows that the null hypothesis is rejected. Hence it is concluded that there is a significant difference exists between post test values of group – B. [refer table no.40]

Pre test and post test values for Group A and Group B without Abdominal Drawing In Maneuver for Ambulation index

Pre test and post test values for ambulation index in group - A and group - B were analyzed by using independent ‘t’ test. At 5% level of significance for 28 degrees of freedom the table ‘t’ value is 2.048 and the calculated ‘t’ value for pre test is .024 and post test is .290 since calculated ‘t’ value is less than the table ‘t’ value it shows that the null hypothesis is accepted. Hence it is concluded that there is no significant difference exists between left and right pre test and post test values of group – A and group – B. [refer table no.41]

DISCUSSION

9. DISCUSSION

Core Stability is the optimal status of lumbar motion segments, which is maintained by the unique interplay between the segments. The stable core would accelerate the lower segments of the body in a more symmetrical pattern, thereby minimizing the energy expenditure and maintaining the proper balance and co-ordinated activity of lower limb. The transverse abdominis muscle acts as a stabilizer of low back and it is one of the global core stabilizing muscles of the lumbar spine. A weak transverse abdominis muscle is often indicated in low back pain and shows a increased alteration in these systems and results in asymmetrical gait patterns.

Hodges et al., proposed that the transverse abdominis contracts prior to the limb movement in healthy individuals, while the pre-activation of the transverse abdominis is poor in those with low back pain.

The active Abdominal drawing in maneuver prepare the core for the further activity of the spine and lower limb movement. Further the activity would bring the pelvic into neutral positions which fetch the length-tension relationship of the pelvic girdle muscles, which would facilitate the optimal strength and co-ordinated activity of the muscles, which might cause symmetry of the gait parameters. The ready state of the core muscle reduces the shear movements in the spine (i.e) facet joints might reduce the pain caused by the segmental instability. The facilitated segmental stability by the active abdominal drawing in maneuver is a very effective strategy to reduce the mechanical low back pain and also improves the symmetry of the gait.

The primary findings in this study was that the abdominal drawing in maneuver had significantly improved the gait parameters from pre-intervention to the post-intervention when compared with the low back pain group and the control groups. We also found that the abdominal drawing in maneuver had significantly reduced the pain from pre-intervention to the post-intervention in the low back pain group.

Peter O’ Sullivan et al., (1998) says that the abdominal drawing in maneuver activates specifically the deep abdominal muscles like transverse abdominis and also with minimal activation of the rectus abdominis muscle.

We found that there is a significant reduction in Pain because the Abdominal drawing in maneuver activates the transverse abdominis and it produces an unconscious motor activity to provide a stabilizing force which increased intra-abdominal pressure and, through its inserting into the thoracolumbar fascia, resulted in increased stiffness of the lumbar spine. In addition, voluntary transverse abdominis contraction, while maintaining a normal lumbar lordotic curve or neutral spine was found to be associated with an unconscious co-contraction of the lower lumbar multifidi. This co-contraction of the transverse abdominis and the multifidus increased stability of the lumbar spine, decreases the low back pain and reduce the risk of subsequent low back injury.

Elizabeth Quinn et al., says that the transverse abdominis muscle stabilize the spine during movements that involve the arms and legs and the weak abdominal muscles tilts the pelvis forward and increases the lordosis in the spine.

John D. willson et al., says the chronic low back pain patients lower level of gait performance and altered and altered physical activity which is mainly due to the abdominal and back muscle weakness, and also due to the pain-avoidance behavior.

The Gait variables measured in this study were, step length, step cycle, co-efficient of variance, time on each foot and the Ambulation index.

Step Length is the distance of one foot moves in front of the other (i.e) the heel strike of one extremity to the heel strike of the opposite extremity. The comparison of the right and left step length determines the gait symmetry. The variability in step Length is at a minimum with patient preferred walking speed.

Step Cycle is the sum of movements made during locomotion by a limb from the time it leaves the ground until it leaves the ground on next occasion.

Co-efficient of variance indicates the amount of variation between footfalls. The higher the coefficient of variance, the poorer the reproduction of a consistent footfall pattern. Thus reduction in the variation between step lengths helps to provide a biomechanically efficient gait pattern.

Time distribution on each foot is mainly based on the pain during the movement and the poor muscular strength due to the immobility of the spine.

Ambulation index is a composite score relative to 100 and is based on foot-to-foot time distribution and average step cycle. The goal is to achieve 100 and it is calculated using the following equation:

AI= {[Avg step cycle) + (RTD/ LTD if RIGHT < LEFT or LTD/ RTD if RIGHT > LEFT] ÷ 2} × 100

Where:

AI = Ambulation Index

Avg = Average

RTD = Right Time Distribution

LTD = Right Time Distribution

David Newell et al., studied the influence of gait parameters on low back pain and control subjects and low back pain patients has a smaller step length, slower walking velocity when compared to control subjects. Thus low back pain patients represent asymmetry of gait.

We found that there is a significant improvement in all the step length, time on each foot, step cycle, co-efficient of variance and the ambulation index. As all these parameters are interconnected during abdominal drawing in maneuver it activates the transverse abdominis and by stimulating the multifidus it maintains the normal lordotic curve or the neutral spine, thereby it reduces the low back pain. The reduction in pain reduces the immobility and improves the individual's performance level. When the muscular performance is improved, it influences on the gait cycles.

When the step length is increased , the number of movements taken place in a particular time interval is reduced (step cycle) and thereby the time taken on each foot is increased to maintain the symmetry, which in turn reduces the energy expenditure and improve core stability with better ambulation of participants in the study.

SUMMARY AND CONCLUSION

10. SUMMARY AND CONCLUSION

Mechanical low back pain patients tend to show core muscle weakness which predisposes to gait disturbances. The gait disturbances in mechanical low back pain patients are not routinely evaluated.

So this study was aimed at evaluating gait in mechanical low back pain groups and improving their gait by strengthening the core muscles through Abdominal Drawing in maneuver. This study also aimed at finding the effects of abdominal drawing in maneuver on low back pain.

Fifteen patients with mechanical low back pain for group-A and fifteen normal individuals for group –B allocated by purposive sampling method. Both the groups were trained for abdominal drawing in maneuver and performed the exercises for the period of four weeks. The gait parameters are measured using the Biodex Gait Trainer 2 in with Abdominal drawing maneuver and without Abdominal Drawing maneuver as a baseline measurements and after four weeks. The pain was measured using the Revised-Oswestry questionnaire as a baseline measurement and at the end of four weeks.

The collected data were analyzed by means of Paired't' test and independent't' test. The analysis showed that there was an increase in the gait performance level in the low back pain group. They also found that the pain significantly reduced in the low back pain group.

This study concludes that there is a statistically significant symmetry of gait in the mechanical low back pain patients who performed abdominal drawing maneuver.

Therefore, it is recommended that abdominal drawing in maneuver exercises can be included in the regular conventional practice to improve the gait performance, reduce the pain and to reduce the risk of subsequent low back injury.

LIMITATIONS AND SUGGESTIONS

11. LIMITATIONS AND SUGGESTIONS

- The study duration was only 4 weeks and it is a short term study, to make the results more valid a long term study is suggested.
- This study was done on smaller population. A larger sample size is recommended for generalisability.
- This study was done with similar exercises for both groups, different exercises for both groups can be given for future studies.
- Studying through gender specific in future shows more valid results.
- More structured environment can be provided for future studies.
- Studies with other gait parameter can be performed.
- Progression of exercises can be given and proper follow up assessment can be taken.

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APPENDIX

APPENDIX I

CONSENT TO PARTICIPATE IN THE STUDY

I .....voluntarily consent to participate in the research study. **'EFFECTS OF ABDOMINAL DRAWING IN MANEUVER ON GAIT AND PAIN INDIVIDUALS WITH LOW BACK PAIN - A COMPARATIVE STUDY.**

The researcher has explained to me the treatment approach in brief, the risk of participation, and answered the questions related to the research to my satisfaction.

Participant signature

Signature of witness

APPENDIX II

ASSESSMENT FORM

Name: **Age/sex:** **Contact number:**

VARIABLES		PRE TEST MEAN VALUES								POST TEST MEAN VALUES							
		Without ADIM				With ADIM				Without ADIM				With ADIM			
		1	2	3	MEAN	1	2	3	MEAN	1	2	3	MEAN	1	2	3	MEAN
Average step cycle (cycles/sec)																	
Average step Length (cm)	Lt																
	Rt																
Co-efficient of variance (%)	Lt																
	Rt																
Time on each foot (%)	Lt																
	Rt																
Ambulation Index (%)																	

APPENDIX III

Revised Oswestry Questionnaire

Name: _____

Date: _____

INSTRUCTIONS: This questionnaire has been designed to enable us to understand how your back pain has affected your ability to manage your everyday activities. Please answer each section by marking the ONE CHOICE that most applies to you. We realize you may feel that more than one statement may relate to you, but PLEASE JUST MARK THE ONE CHOICE WHICH MOST CLOSELY DESCRIBES YOUR PROBLEM RIGHT NOW.

Pain Intensity	**Personal Care (Washing, Dressing, Etc.)**
❑ The pain comes and goes and is very mild. ❑ The pain is mild and does not vary much. ❑ The pain comes and goes and is moderate. ❑ The pain is moderate and does not vary much. ❑ The pain comes and goes and is severe. ❑ The pain is severe and does not vary much.	❑ I would not have to change my way of washing or dressing in order to avoid pain. ❑ I do not normally change my way of washing or dressing even though it causes some pain. ❑ Washing and dressing increases the pain, but I manage not to change my way of doing it. ❑ Washing and dressing increases the pain and I find it necessary to change my way of doing it. ❑ Because of the pain, I am unable to do some washing and dressing without help. ❑ Because of the pain, I am unable to do any washing or dressing without help.
Lifting	**Walking**
❑ I can lift heavy weights without extra pain. ❑ I can lift heavy weights, but it causes extra pain. ❑ Pain prevents me from lifting heavy weights off the floor. ❑ Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently positioned, e.g., on a table. ❑ Pain prevents me from lifting heavy weights, but I can manage light to medium weights if they are conveniently positioned. ❑ I can only lift very light weights at the most.	❑ Pain does not prevent me from walking any distance. ❑ Pain prevents me from walking more than one mile. ❑ Pain prevents me from walking more than ½ mile. ❑ Pain prevents me from walking more than ¼ mile. ❑ I can only walk while using a cane or on crutches. ❑ I am in bed most of the time and have to crawl to the toilet.

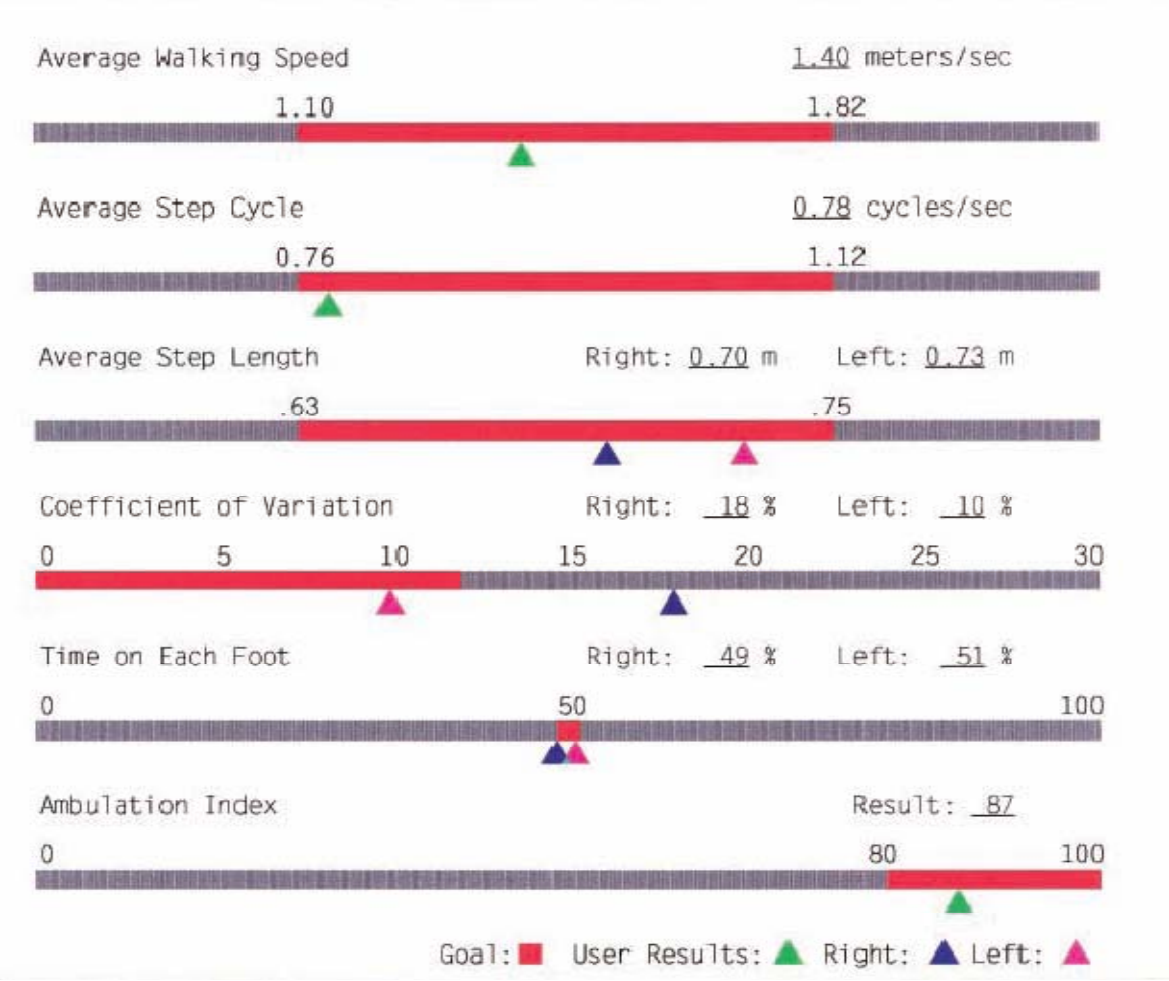
Sitting	**Standing**
❑ I can sit in any chair as long as I like without pain. ❑ I can only sit in my favorite chair as long as I like. ❑ Pain prevents me from sitting more than one hour. ❑ Pain prevents me from sitting more than ½ hour. ❑ Pain prevents me from sitting more than ten minutes. ❑ Pain prevents me from sitting at all.	❑ I can stand as long as I want without pain. ❑ I have some pain while standing, but it does not increase with time. ❑ I cannot stand for longer than one hour without increasing pain. ❑ I cannot stand for longer than ½ hour without increasing pain. ❑ I cannot stand for longer than ten minutes without increasing pain. ❑ I avoid standing because it increases the pain straight away.
Sleeping	**Social Life**
❑ I get no pain in bed. ❑ I get pain in bed, but it does not prevent me from sleeping well. ❑ Because of pain, my normal night's sleep is reduced by less than one-quarter. ❑ Because of pain, my normal night's sleep is reduced by less than one-half. ❑ Because of pain, my normal night's sleep is reduced by less than three-quarters. ❑ Pain prevents me from sleeping at all.	❑ My social life is normal and gives me no pain. ❑ My social life is normal, but increases the degree of my pain. ❑ Pain has no significant effect on my social life apart from limiting my more energetic interests, e.g., dancing, etc. ❑ Pain has restricted my social life and I do not go out very often. ❑ Pain has restricted my social life to my home. ❑ I have hardly any social life because of the pain.
Traveling	**Changing Degree of Pain**
❑ I get no pain while traveling. ❑ I get some pain while traveling, but none of my usual forms of travel make it any worse. ❑ I get extra pain while traveling, but it does not compel me to seek alternative forms of travel. ❑ I get extra pain while traveling which compels me to seek alternative forms of travel. ❑ Pain restricts all forms of travel. ❑ Pain prevents all forms of travel except that done lying down.	❑ My pain is rapidly getting better. ❑ My pain fluctuates, but overall is definitely getting better. ❑ My pain seems to be getting better, but improvement is slow at present. ❑ My pain is neither getting better nor worse. ❑ My pain is gradually worsening. ❑ My pain is rapidly worsening.

APPENDIX IV

Biodex Gait Training Exercise Summary

Name: Gopi		**Date:** 07/11/2011
Height: 59"-65	**Age:** 26	**Gender:** Male

Time: 3.00 **Avg Speed: 2.00MPH** **Distance: 180 METERS**



Comments: